Weiser Area
Ground Water Quality
Management Plan

2003

This plan meets the requirement set forth in Policy PM00-04
to address the nitrate concern in the ground water in the Weiser Area.

See Appendix B, page 52, for the list of Committee and technical advisory members who contributed their time to the creation of this report.

For questions regarding this report, contact Linda Boyle, IDEQ, at 208-373-0550 or lboyle@deq.state.id.us or the Committee Chairperson Dennis Lance, at 208-549-4003 or dlance@ruralnetwork.net. More information can be found in the IDEQ webpage at http://www.deq.state.id.us/water/water1.htm#groundwater; scroll to "Nitrates".

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EXECUTIVE SUMMARY

Ground water monitoring in the Weiser Area has demonstrated elevated nitrate levels above the Environmental Protection Agency's established Maximum Contaminant Levels for health concerns. To address this issue, the Idaho Department of Environmental Quality (IDEQ) formed the Weiser Area Ground Water Quality Advisory Committee (the Committee) to design a management plan to reduce nitrate levels. This plan is intended to be a communication tool, not an enforcement tool, to provide direction and guidance for the community and its leaders.

The Committee identified six land-use activities that can potentially affect nitrate levels for ground water in Washington County. To supplement existing regulations governing these activities, recommendations for each activity are provided in this document. These activities can be summarized as follows:

- Agriculture – Employ irrigation and nutrient management techniques together.
- Industrial/Municipal Wastewater Land Application – Encourage additional education for personnel/operators.
- Residential –Encourage owners of existing systems to conform to guidelines and regulations established for new construction of septic systems and wells. Residential landscaping and animal pasture activities should follow the suggestions in the agriculture and animal feeding operation portions of this document.
- Animal Feeding Operations (AFO) – Recommend separation, minimization, and proper management of waste products for all sizes of animal feeding facilities.
- Ground Water Recharge – Identify land uses and man-made features that contribute to ground water recharge. This activity has not been significant in the Weiser Area. However, ground water recharge, whether intended or not, can have both beneficial and detrimental effects on ground water quality.
- Ground Water/Surface Water Interaction – Provide educational materials for increased public awareness of ground water/surface water inter-relationships.

The Committee will lead a cooperative with IDEQ, the Idaho State Department of Agriculture (ISDA), and the Idaho Department of Water Resources (IDWR) to implement this plan. Other governmental agencies will also assist in conducting surveys,

making presentations, and providing information. Education, public awareness, and adoption of recommendations are key to the success of this plan.

The Committee acknowledges that other water quality efforts in the Weiser Area, if successful, will contribute to the success of this plan. Other efforts include the Snake River-Hells Canyon Total Maximum Daily Load (TMDL), the Weiser River TMDL, and the City of Weiser Source Water Protection Plan.

Presently adoption of this plan is strictly voluntary. A compilation of ground water monitoring data collected by state agencies will be made each year by the IDEQ, with the support of the Committee. Additionally, every four years, an extensive review and evaluation of the effectiveness of the plan will be completed as a joint effort among participating agencies. At each step, modifications to the plan will be discussed. If improvements to ground water nitrate concentrations are not noted, regulatory intervention may become necessary.

Weiser Area
Ground Water Quality Management Plan

Section I: Background

A. Introduction

The shallow alluvial aquifer in the Weiser Area is the most common water-bearing zone from which wells receive water. The typical depth to ground water is from 20 to 100 feet below the ground surface. Recharge for this aquifer system comes primarily from snowmelt and irrigation water (Young 1977).

The area climate is semi-arid, characterized by low annual rainfall, moderately hot summers, and cold winters. Annual precipitation averages 10.5 inches (USDA 2001). Leaching of soluble minerals from the soil profile is common in the Weiser Area, and ground water monitoring by several government agencies show increasing levels of nitrate.

The Weiser Area covers approximately 31,500 acres and land use is 45% rural (USDA 1997). The area has been critically impacted by nitrate contamination that affects an estimated population of 5,000 residents who depend on this aquifer system as their primary source of drinking water. Sixty-five domestic wells have been sampled routinely; of those, 72% indicate nitrate levels above 5 mg/l, and 45% of the wells have been impacted beyond the nitrate Maximum Contaminant Level of 10 mg/l (see Figure 1, page 8).

The Weiser Area has been placed on the IDEQ nitrate priority list and is ranked the highest in the state in terms of degradation. Older or poorly constructed wells may be one factor in the deterioration of ground water quality. Land-use activities that may play a significant role include agricultural fertilization, feedlots, livestock grazing, livestock waste, wastewater land application, stormwater runoff, and septic systems (see Figure 2, page 9). This management plan has been developed with the intent of educating the public on methods to prevent additional nitrate degradation and to improve existing conditions by education and voluntary actions.

The Committee, in developing the management plan, has expressed the need to include Weiser Cove in the Weiser Area for future ground water monitoring studies. The land uses and topography are similar in the Weiser Cove to the delineated Weiser Nitrate Priority Area.

The primary focus for this ground water management plan is on the Weiser Area. However, the Committee has also expressed a desire that this plan be applicable to all of Washington County.

Figure 1. Map of Weiser Nitrate Priority Area

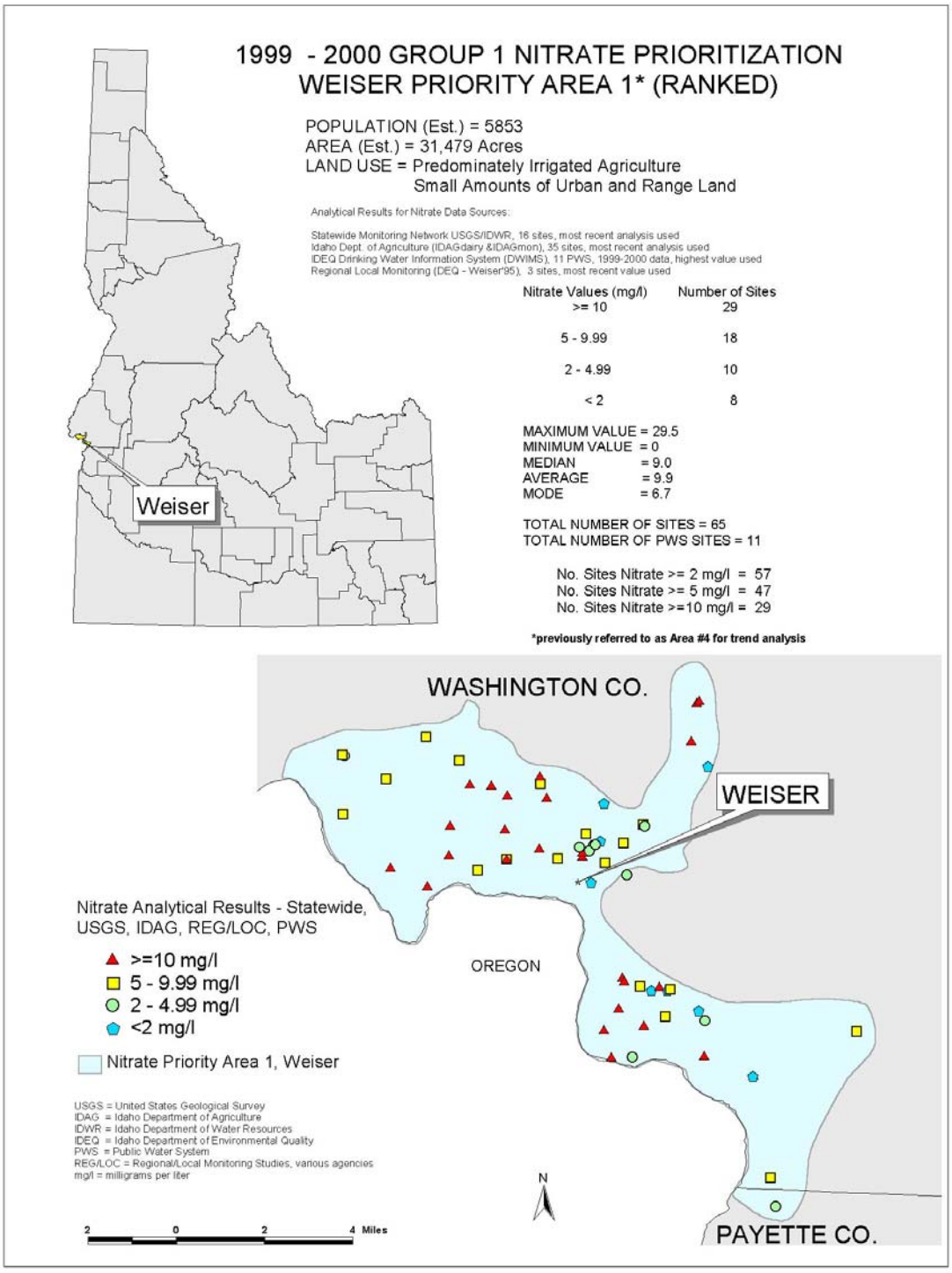
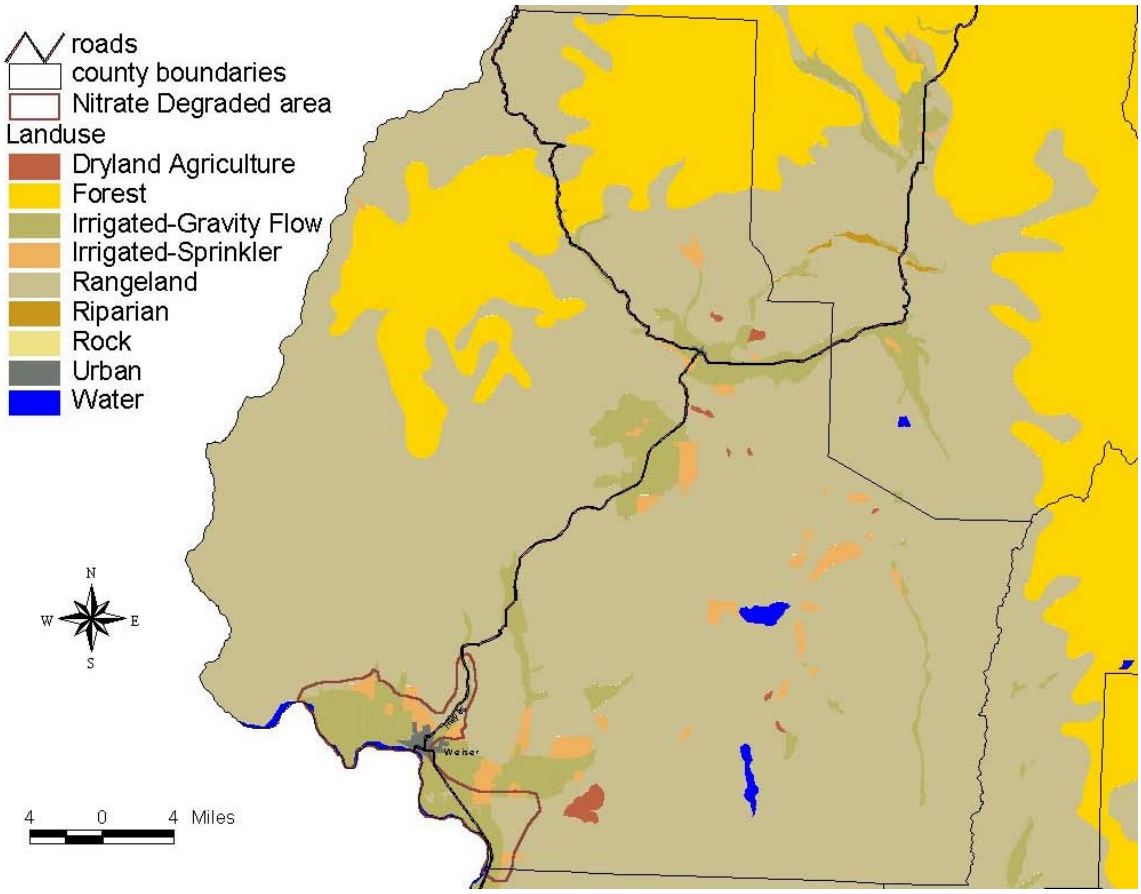


Figure 2. Land-Use Map



B. Authorities

1. The IDEQ is designated as the primary agency to coordinate and administer ground water quality protection programs for the state (Ground Water Quality Protection Act of 1989, Idaho Code 39-120). Various state and local agencies have responsibilities for and are involved in implementing the Ground Water Quality Plan (adopted in 1992 and amended in 1996).

2. The Ground Water Quality Rule (IDAPA 58.01.11.400.02 and IDAPA 58.01.11.400.03) sets forth a number of alternative actions that the IDEQ may follow when a numerical ground water quality standard has been exceeded, or when a standard has not been exceeded, but significant degradation of the ground water has been detected.

3. In March 2000, the Policy for Addressing Degraded Ground Water Quality Areas (Policy No. PM00-04) was published.

   - One purpose of this policy is to set forth a process to identify, designate, and delineate areas where ground water quality is significantly degraded as defined by the rule. Nitrate levels in the Weiser Area ground water have been detected by several government agencies to be near or above the State of Idaho Ground Water Quality Standard of 10 mg/l (IDAPA 58.01.11.200.01).

   - Another purpose of this policy is to develop ground water quality management strategies for improving ground water quality in high priority areas based on current categorization and applicable standards with local input. The Weiser Area Ground Water Quality Advisory Committee was formed as a pro-active measure to address local ground water quality degradation. IDEQ has completed the prioritized list of areas with nitrate concerns, and the Weiser Area has been ranked number one in the state.

4. IDEQ formed the Ground Water Monitoring Technical Committee to compile the state's ground water data. This committee is comprised of technical representatives from local, state, and federal agencies and interested parties. They have met quarterly since 1996 to analyze trends in Idaho's ground water quality. From this process nitrate became a concern for IDEQ due to the potential health risks to humans, livestock, and aquatic life.

   The Ground Water Monitoring Technical Committee established criteria to prioritize degraded areas. In 2000, twenty-five areas with elevated nitrate were delineated and identified using ground water data collected through 1999. To be placed on this priority list, 25% or more of the sample wells needed to exceed 5 mg/l of nitrate.

   The twenty-five nitrate priority areas were then ranked to determine the severity of the nitrate problem and to establish a work priority for agency resources (see Figure 3, page 11). Ranking criteria consist of population, existing water quality, and water quality trends (see Table 1, page 12 for the Weiser Area). The process also takes into account impacts on beneficial uses other than water supply, such as aquiculture.

   This ranking will be used to prioritize the development and implementation of strategies to help reduce nitrate loading from land-use activities. Data used to score priority areas will be updated on a continual basis, and changes to the ranking list will be re-issued every two years. The initial ranking process was finalized in December 2001. For more information, refer to the following: http://www2.state.id.us/deq/water/gw/nitrate/nitrate_ranking.htm.

Figure 3. Nitrate priority areas in Idaho.

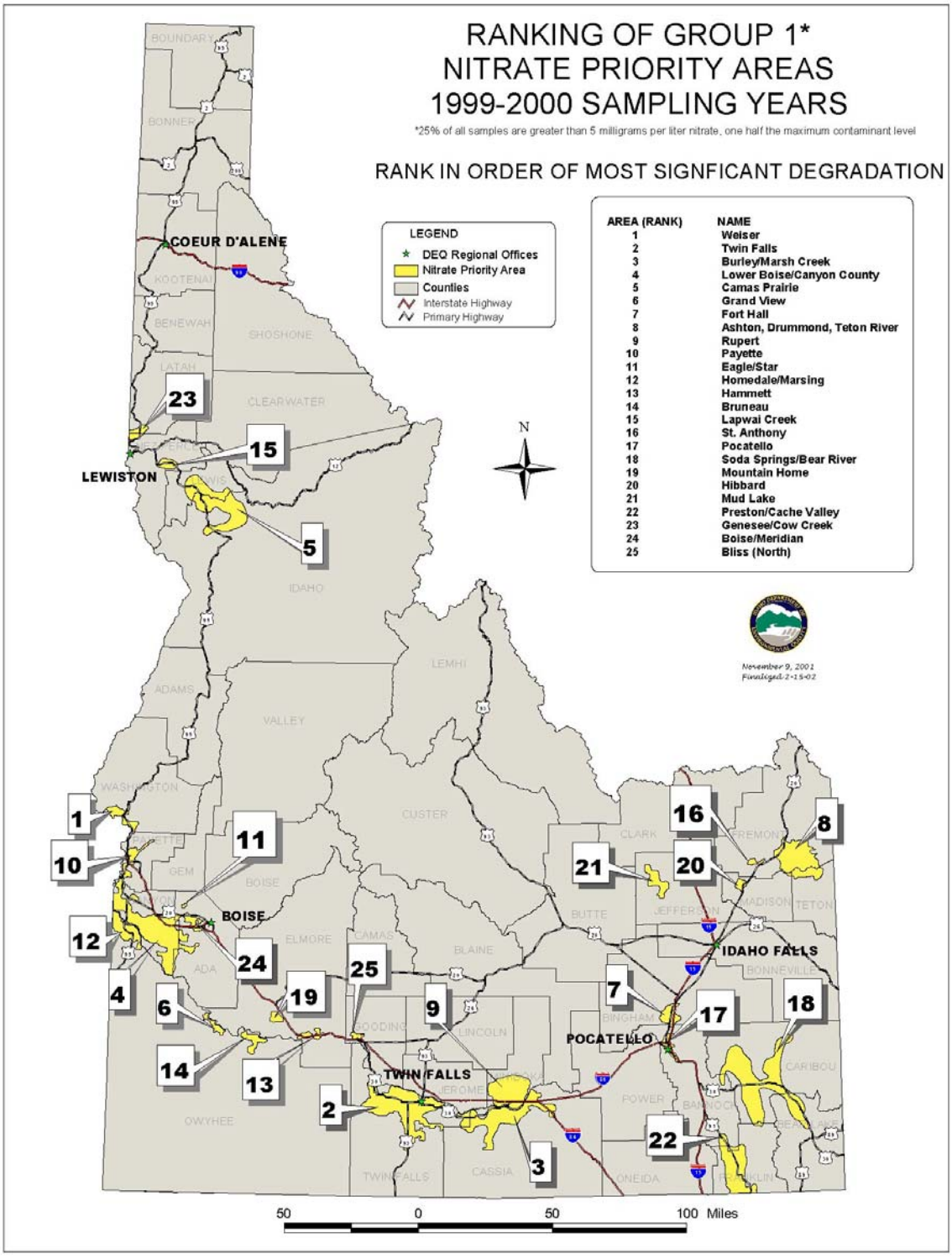


Table 1. Priority Area Number: 1		Priority Area Name: Weiser		
Ranking Criteria			Score	**Comments**
1) POPULATION				
	Points	**Select One**		
a) Within Priority Area				
<1000	1			
1000 to 10,000	2	X	2	Population = 5853
10,000 to 100,000	3			
		Subtotal	**2**	
b) Source Water Protection Areas or Public Water System wells in Priority Area				
0	0			
1 to 20	1	X	1	11 PWS
>20	2			
		Subtotal	**1**	
c) Number of Wells with Nitrate (NO_3) ∃ 10 mg/l				
0	0			
1 to 2	1			
3 to 5	2			
6 to 9	3			
10 to 15	4			
>15	5	X	5	29 Wells
		Subtotal	**5**	
		Population Score	**8**	
		Max Possible Score = 10		
2) WATER QUALITY				
	% wells	**Nitrate Concentration**		
		Criteria		
Percent of wells with Nitrate (NO_3) ∃ 2 mg/l	88%	2	1.76	
Percent of wells with Nitrate (NO_3) ∃5 mg/l	73%	5	3.65	
Percent of wells with Nitrate (NO_3) ∃ 10 mg/l	45%	10	4.50	
		Water Quality Total	**9.91**	
3) WATER QUALITY TRENDS				
		Select One		
Increasing	10	X	10	
No Discernable Trend	5			
Decreasing Trend	0			
		Trend Score	**10**	
		Max Possible Score = 10		
4) OTHER BENEFICIAL USES				
Other beneficial uses are impaired	2	Yes=2 No = 0	No	
		Beneficial use score	**0**	
		Max Possible Score = 2		
		Total Score	**27.91**	

5. The Weiser Area Ground Water Quality Advisory Committee is composed of local area residents and government agencies to represent the broad range of interests within the county. IDEQ is the lead agency assisting the Committee in developing a management plan to address the ground water degradation in the county. Other agencies providing technical support include the following:

   - Idaho Department of Water Resources (IDWR) – well drilling permits, water rights, adjudication, and Statewide Ambient Ground Water monitoring

   - Idaho State Department of Agriculture (ISDA) – all aspects of agricultural land use, including ground water

   - Natural Resources Conservation Service (NRCS) – all aspects of agricultural land use

   - Weiser River Soil Conservation District - all aspects of agricultural land use

   - Idaho Association of Soil Conservation Commission (IASCC) – support local offices (Soil Conservation Districts and Soil and Water Conservation Districts)

   - Idaho Rural Water Association (IRWA) – wellhead protection and community drinking water

   - Southwest District Health (SWDH) – Permitting agency for Subsurface Sewage Disposal Systems and agency responsible for the administration of Sanitary Restrictions for subdivisions.

   - University of Idaho Cooperative Extension System – soil and water

   The full Committee and its subcommittees have met in open public forums since October 2001 to form the recommendations in this document. The Committee has agreed to promote and encourage a voluntary approach for addressing the ground water contamination in the county. Progress will be based on the evaluation criteria outlined in Section VIII, Evaluation of Management Plan Progress and Success.

   See Appendix D for additional sources of information on regulatory laws, rules, policies, and criteria; Committee members; governmental agency descriptions and contact information.

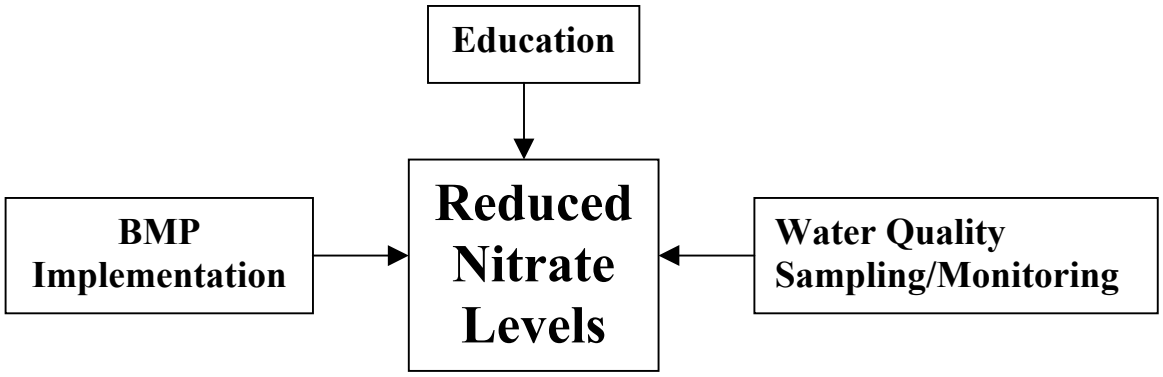
Section II Management Plan Goal

The ultimate goal of this plan is to reduce the levels of nitrate in ground water for the Weiser Area through education and ground water monitoring. The recommended activities should, within a reasonable time, reduce nitrate levels in the Weiser Area, enabling it to be removed from the statewide priority list. Reducing the nitrate levels may be a long-term process; therefore, the monitoring for this plan is anticipated to take twelve years in order to determine a trend.

The educational goal of this plan is intended for all of Washington County. The plan also addresses arsenic as a constituent of concern in this area. The arsenic in the Weiser Area has been found to occur naturally in the ground water at levels that may impact health (Howarth 1995).

Another goal of this plan is to educate domestic well owners on the ground water quality of their individual wells. Well owners need to understand that it is their responsibility to have their ground water tested to determine potential health risks. No governmental agency routinely samples domestic wells. Domestic wells do not require the governmental oversight and regular sampling that public water system wells do. Domestic wells are included in some ground water studies, and those well owners will know their ground water quality from those studies. The cost to a domestic well owner is reasonable (about $20/constituent sampled), and laboratories are easily accessible (contact SWDH or IDEQ). More information can be found in Appendix E.

Figure 4. Management Plan Flowchart.



Section III Management Plan Approach

A. Introduction

1. The Weiser Area Ground Water Quality Advisory Committee has chosen to implement this Management Plan on a voluntary basis. This voluntary approach is based on the belief that individuals, businesses, organizations and governments, given adequate information and encouragement, will take positive actions to adopt or modify practices and activities aimed toward the reduction of nitrate loading to ground water. Since the plan is voluntary, it is assumed that additional regulatory requirements will not be necessary to achieve the desired outcome. There are other important advantages to this approach:

a) It allows for more flexibility than a regulatory approach. Individuals, businesses, or organizations may choose to address the nitrate problem with innovative solutions.

b) It allows people to willingly accept responsibility for their property and make the necessary changes if they understand the issues. People will feel it is a choice they are making rather than something they are being forced to participate in.

c) It provides an opportunity to foster participation in the process of nitrate reduction among individuals, organizations, and businesses that are not currently regulated.

2. As described in Section VIII, periodically the state agencies and the Committee will jointly evaluate the progress and success of this program in reducing the nitrate levels in the county's ground water. IDEQ will provide oversight and assistance for this process.

3. It is hoped that the voluntary nature of this management plan will help avert the need for new regulatory requirements. It is intended to complement existing water quality rules, regulations and permitting requirements. However, if the voluntary approach does not result in satisfactory progress towards reducing nitrate levels in the ground water, mandatory requirements may be considered in the future. Idaho Code 39-120 and the Ground Water Quality Plan provide for inclusion of mandatory requirements as part of this management plan.

   See Appendix D for more information on Idaho Code and Appendix E for the Ground Water Quality Plan.

B. Ground Water Contamination Concerns

A nonpoint pollutant source is a source of contamination with no visible or obvious point from which contamination originates. Identified below are nonpoint pollutant sources that are associated with nitrate contamination. When these land-use practices are managed appropriately, they do not result in water quality degradation. However, land-use practices such as these can lead to decreased water quality when poorly managed or inadequately controlled.

The Committee initially identified six land-use activities with practices that could affect ground water nitrate levels:

1. Agriculture

a) Irrigated agriculture is the dominant land use in the county with approximately 107,423 (USDA 1997) acres under cultivation. The major sources of nitrate from agricultural activities come from all forms of fertilizers, legumes and the mineralization of organic matter. Nitrogen not utilized by plant growth is stored in the soil and can be leached to ground water as nitrate, if sufficient water is available to move it through the soil profile. See nitrogen cycle diagram in Appendix H.

b) Improper handling and mixing of agricultural chemicals.

c) Improper handling of solid agricultural wastes.

2. Industrial/Municipal Wastewater Land Application Areas

a) Wastewater land application facilities generate nutrient rich process water. Such facilities are among the few sources of nitrate that are already regulated. These facilities are required to obtain a National Pollution Discharge Elimination Systems Permit (NPDES) if discharging into water bodies, and/or a Waste Water Land Application Permit (WWLAP) to apply wastewater to land.

b) Today, through IDEQ's regulatory waste discharge permit system and the cooperation/innovation of the facilities in the Weiser Area, land appliers are:

- Expanding their land application areas.
- Building or expanding process wastewater treatment and storage.
- Scheduling process water applications to meet crop nutrient and water needs.
- Developing management plans for irrigation and nutrient use.
- Developing water and nutrient budgets.

- Periodically sampling wastewater, ground water, soil and crops as required by permit.

- Preparing reports on how activities are functioning and whether the process is meeting the goals that were established.

3. Residential

a) Domestic septic systems may contribute to elevated ground water nitrate concentrations. Ground water problems can occur in areas where high septic densities exist. Areas of high septic density occur primarily within the urban growth boundaries of cities or in isolated subdivisions. Standard septic systems are not designed to remove nitrate. In low-density settings, the impact to the ground water is low because of dilution by the ground water and the small volume of discharge spread over a large area. However, as densities increase, the discharge volume increases, and may overcome the ground water's ability to dilute the wastes, thereby increasing the potential for contamination.

b) Several other activities associated with residential development were also identified as possible contributors to the nitrate problems in residential areas:

- Excessive fertilization related to landscaping, lawns and gardens.

- Over-watering related to landscaping, lawns and gardens.

- Well construction, well abandonment, wellhead management and well location.

- Animal pastures and/or ranchettes (small residential acreages).

The combination of these activities with septic system discharge makes residential developments a potential source of nitrate contamination in ground water.

c) Proper use and installation of home water treatment systems.

4. Animal Feeding Operations (AFO)

a) An AFO is generally defined as the holding or confining of animals in buildings, pens or lots. Regulations for protecting ground water are in place for larger AFOs (greater than 200 dairy cows or 1000 steers, see Appendix D for specific resources) regarding solid and liquid effluents. Recommendations discussed in this management plan apply to all AFOs, regardless of size of operation.

b) AFOs are increasingly incorporating pollution prevention technologies into their environmental management systems and strategies. AFO managers are focusing on manure and wastewater management while providing well-maintained feedlot conditions for animals.

c) Proper use and installation of water treatment systems.

5. Ground Water Recharge

a) Unmanaged ground water recharge occurs whenever standing water is allowed to seep into the soil. Depending on the specific conditions, unmanaged recharge with contaminated water may adversely affect the ground water quality. See hydrologic cycle in Appendix H.

b) Managed ground water recharge takes place when water is pumped, allowed to seep, or is injected into the ground to replenish the aquifer.

6. Ground Water/Surface Water Interaction

The mutual influence and interaction between ground water and surface water quality is an important consideration in evaluating sources of nitrate contamination. In some areas ground water and surface water are hydraulically connected and combine to form a single water source.

Section IV Methodology to Accomplish the Management Plan Goal

The Committee has outlined the following methodology:

1. Implement the management plan in a manner that encourages voluntary participation by members of the community to protect and improve ground water quality in the Weiser Area and avoid possible regulations.

2. Reduce nitrate loading to the ground water without adversely affecting the economy.

3. Use the plan as a communication tool that will provide direction and guidance to the community about the basic steps needed to prevent future nitrate level increases.

4. Assure compliance with existing regulations through periodic review by IDEQ of permit conditions at regulated sources.

   See Sections VI, VII, and VIII for specific implementation activities, implementation tasks and plan evaluation.

Section V Methods for Implementing the Management Plan

The Committee considered the following methods most appropriate for implementing a voluntary action plan:

1. Develop awareness in the Weiser Area community about the nature of the nitrate ground water issues, including causes, effects, concerns, and remedies.

2. Identify, organize, and provide information and potential funding sources for Best Management Practices (BMPs) that will assist individuals, public entities, businesses, and organizations to reduce nitrate loading.

3. Encourage research, investigation, and the development of materials useful for addressing nitrate concentration concerns where information may not be available or in a useable form.

4. Develop educational material that will allow the community to independently assess and choose the BMPs most useful to them for reducing the nitrate loading to ground water.

   See Sections VI, VII, and VIII for specific implementation activities, implementation tasks and plan evaluation.

Section VI Implementation Activities

A. Agriculture

Both irrigation and nutrient management must be considered in addressing the nitrate leaching concerns for irrigated agricultural land.

1. Irrigation Management

a) Several irrigation methods are used in the Weiser Area; including gravity, solid set, hand line, wheel line, drip, surge, and center pivot. In the late 1960s, sprinkler irrigation practices were initiated in the valley. Beginning in the 1970s, whole irrigation projects were constructed based on sprinkler irrigation. Currently, 62% of existing irrigation systems utilize gravity that includes gated pipe or concrete ditches with siphon tubes, 12% have earth ditches, 4% drip and surge, and 22% use sprinklers (USDA assumed 2001). Gravity methods of irrigation are most highly disposed to the leaching of nitrate through the soil profile due to the volume of water applied.

b) Proper application of water, regardless of irrigation method, requires a knowledge of the following:

- Crop water use demand
- Soil infiltration rate
- Soil characteristics
- Soil topography
- Frequency of application
- Application rate
- Mechanics of the irrigation system
- Evapotranspiration rate

c) All irrigation systems have the potential to increase nitrate levels in ground water. Continual maintenance of irrigation systems is critically important in order to reduce over-application of water. Accurate water use models as well as improved technologies to apply and monitor water application have resulted in greater irrigation efficiency.

2. Nutrient Management

a) Applying nitrogen in excess of crop needs can cause ground water contamination. Growers today generally have a sound understanding of nutrients and water and their effect on crop quality and yield. However, over-application of nitrogen can occur in several ways:

- Applying fertilizers at rates greater than crop uptake.
- Failing to account for residual and organic nitrogen sources present in the soil profile, especially nitrogen-fixing crops.
- Inappropriate timing of nutrient application with regard to crop needs.
- Failure to account for other nitrogen sources such as irrigation water.

b) Crop nutrient recommendations by crop advisors continue to be modified, favoring more efficient management techniques that may better protect ground water.

3. Recommended Irrigation and Nutrient Management Practices

Using the following practices could benefit irrigated agricultural farming and protect ground water quality. Since no single practice will completely resolve the leaching problem, practices should be implemented in combination with each other in order to reduce further leaching of nitrate into the ground water.

a) Crop management: Crop management strategies and recommendations to address irrigation and nutrient management may be developed jointly between the grower and any of these entities:

- Natural Resources Conservation Service (NRCS)
- Idaho Soil Conservation Commission (ISCC)
- Weiser River Soil Conservation District
- University of Idaho Cooperative Extension System – Local office
- United States Department of Agriculture (USDA) – Agriculture Research Service
- Idaho State Department of Agriculture
- Weiser Irrigation District, Mann Creek Irrigation District, Lower Payette Ditch, Mill Ditch, Cove, Galloway Canal, Mann Creek, Monroe Creek, and Jenkins Creek
- Agricultural associations
- Irrigation equipment dealers
- Private agricultural service companies

See the Appendix D for more information.

b) Increase awareness of the nitrate problem: Provide education and information to assist in making informed choices on how best to address irrigation and nutrient concerns.

c) Irrigation scheduling: Balance irrigation applications with crop needs and soil characteristics throughout the irrigation season. Efficient irrigation scheduling, regardless of application method, is becoming the preferred practice in the Weiser Area. This involves the correct timing, placement, and volume of water to reduce nitrate leaching beyond the root zone.

d) Plant tissue and soil testing: Determine fertilizer usage based upon crop demands as determined by plant tissue and soil testing. Apply only the amount of fertilizer necessary to maintain crop quality and yield based upon most recent test analyses.

e) Irrigation water sampling: Consider nutrient concentration in irrigation water when developing nutrient management plans.

f) Nutrient management: Properly timed fertilization should coincide with specific crop nutrient uptake characteristics. In general, the following guidelines may apply:

- Single application (spring grains, peas, beans, alfalfa).
- Split application (winter wheat, corn, pasture).
- Multiple applications (onions, sugar beets and potatoes – often based on petiole samples).

g) Precision farming: Balance nutrient and irrigation applications to crop requirements according to soil variations within a field to whatever degree is practical for precision irrigation systems.

h) Manage inputs for all crops: Management activities and strategies identified in this plan should be followed regardless of the crop value.

i) Nutrient removal by proper crop rotation: Consider crop rotations that will salvage residual nutrients, including those from previous nitrogen-fixing crops.

j) Nutrient value of compost and manure: Account for the nutrient value of any compost and manure spread on a field before adding additional fertilizer. If these nutrients have not been taken into account, over-fertilization becomes more likely.

k) Maintain irrigation equipment: Develop operation and maintenance schedules for irrigation equipment to ensure water is applied at correct rates.

Specific information about these practices is explained in Section VII. References and resources are listed in Appendix D.

B. Industrial/Municipal Wastewater Land Application Areas

1. Introduction

Historically, the focus of wastewater land application sites was to dispose process water. The highest priority was to prevent runoff from the application fields. Today, IDEQ works with facilities to issue and/or re-issue wastewater land application permits to land apply wastewater, prevent runoff, and protect ground water quality.

2. Recommended Management Practices

To properly manage nitrate in a land application facility, both water and nutrients must be managed. The following steps can be used by any land application facility to manage water and nutrient resources:

a) Identify any limiting factors for the land to properly utilize the wastewater.

b) Apply the wastewater at proper agronomic rates.

c) Review pre-treatment, waste minimization, and conservation practices that may reduce the quantity and concentration of nitrogen compounds in wastewater.

- Determine whether there are pollution prevention opportunities through waste minimization efforts.
- Market by-products.
- Reuse process waters for other internal functions.

  Pollution prevention opportunities can save in several ways:

  - ✓ Reduce processing and disposal costs.
  - ✓ Generate revenue through service or products.
  - ✓ Reduce regulatory oversight costs.

d) Observe and monitor the process regularly to recognize problems early and make adjustments accordingly. Routine visual observations confirm assumptions and allow periodic system adjustments (fine-tuning). Review analytical results in a timely manner.

e) Continually reassess functions and systems to develop viable alternatives to meet ground water protection goals. Determine what is the most economic means to achieve the established goals.

f) Encourage continuing education for all relevant personnel/operators.

g) Encourage proper construction and maintenance of storage/treatment wastewater conveyance systems. New lagoons and wastewater conveyance facilities should be designed, constructed, and maintained in accordance with state standards to minimize leakage of stored wastewater.

Available resources are provided in Appendix D.

C. Residential

1. Introduction

Several activities associated with residences may contribute to the nitrate concentration issue. These include septic systems; landscaping, lawn and garden activities; wells; and animal pastures.

2. Septic Systems

The standard household septic system is not designed to effectively treat wastewater for nitrates. Properly operating systems deliver a certain amount of nitrate to the ground water (an average of about 45 mg/l nitrate (U.S. EPA 1978)). Generally this source of nitrate is not a concern when the volume of wastewater is relatively small compared to the volume of ground water.

However, there is a concern when the density of septic systems exceeds the dilution capabilities of the ground water system. In the Weiser Area, septic system densities may affect ground water quality.

Recommended Management Practices

- Southwest District Health will require a nutrient-pathogen study for high density/small acreage developments that rely upon on-site subsurface sewage disposal to evaluate developments impact to ground water. SWDH will continue to evaluate the Land Development program and Subsurface Sewage Disposal program to keep current with IDEQ rules and guidance. SWDH will also provide septic tank maintenance information to all owners of septic system as new systems are installed and existing systems are replaced. Basic health information concerning nitrate in the drinking water will also be provided with each septic permit issued in the Weiser Area.

- City and county government and planning departments should be encouraged to routinely review development impacts to area ground water quality and require mitigation where necessary.

  See Appendix D for more information on septic systems.

3. Landscaping, Lawns and Gardens

Several landscaping, lawn and garden activities on the Weiser Area soils can deliver nitrate to ground water. Not understanding the diagnosis and treatment of landscape, lawn and garden systems can result in over-fertilizing and watering and/or mis-timing of fertilizing and watering.

Recommended Management Practices

Residents need to understand the complex nature of their landscape, lawn, or garden problem before attempting to solve the problem. To do this, they should seek help, advice, and information from knowledgeable professionals. In many cases, applying additional fertilizer or water will not solve the plant health problem, but may only deliver additional nitrate to the ground water.

- Residents need to apply fertilizers according to label instructions for the plants being fertilized. Fertilizers applied at greater than recommended rates can lead to a nitrogen build-up and/or imbalance of nutrients in the soil profile. With enough water, these nutrients will potentially leach into the ground water.

- Residents should provide only that amount of water needed to maintain a healthy landscape, lawn or garden. Over-watering tends to drive available nutrients below plant roots. These nutrients easily find their way to ground water as additional water is applied or precipitation occurs. This situation also leads residents to use additional fertilizer to replace the nutrients washed below the root zone.

- Residents should apply fertilizer and water in amounts and at times that do not contribute to nitrate leaching. Over-watering immediately after applying certain fertilizers can wash nutrients past the root zone making them unavailable for plant uptake and a threat to ground water quality.

- The University of Idaho Master Gardener Program, Idaho Department of Agriculture, USDA, and local businesses should be encouraged to hold workshops to educate homeowners in responsible landscape maintenance and to address nitrate loading issues.

  See Appendix D for further information.

4. Wells – Construction/location/leakage/abandonment

a) Contaminated water moving down a well casing from the land surface to ground water or moving between aquifers via well bores can contribute to the nitrate contamination problem. Improperly sealed wells can facilitate water movement, possibly carrying contaminants from land surface to the ground water or between aquifer units.

b) Locating a septic system or other contamination source too close to or up gradient from a poorly sealed well may cause the well to capture contaminated water and allow contaminated water to move further into the aquifer or between aquifers.

c) Improperly abandoned wells provide a direct connection between the surface and the aquifer, which could allow surface contamination a direct path to ground water

Recommended Management Practices

- Encourage owners of older wells to inspect their well casings and seals to ensure that no leakage is occurring. If they detect a problem, encourage them to make necessary repairs or replacements to correct the problem.

- Encourage people to test their well water annually for total coliform and Escherichia coliform bacteria, nitrate, and periodically for arsenic content.

- Encourage local officials to pass regulations that will require all wells to comply with current standards.

- Examine the location of existing wells, septic systems, and other possible contamination sources before siting a new well or septic system.

- Encourage owners and well drillers to construct new wells according to the Idaho Department of Water Resources Well Construction Standards, IDAPA 37.03.09.

- Promote storage of liquid and solid contaminants at least 50 feet away from wellheads or provide barriers to prevent well contamination.

- When using chemigation, provide back-flow prevention devices to prevent contamination of the well and ground water through back siphoning of chemigation tanks.

- Implement well abandonment according to Idaho Department of Water Resources guidelines IDAPA 37.03.09 Rule 25 Section 12 – Abandoning of Wells.

See Appendix D for additional information on these topics.

5. Animal Pastures

Pasturing animals on small acreages can degrade ground water if not managed properly. Pasture management involves more than just grass care. It involves managing the interrelationships among animal, plants, and soil (Jensen 2002). Grazing management should be designed to assure that domestic livestock grazing is functional within the parameters of the biologic system (Jensen 2002).

- Excess manure in a pasture may allow nutrients to accumulate in the soil making them available to leach when irrigation or precipitation occurs.

- Overgrazing a pasture can limit the plant's ability to utilize manure for growth. This leads to an accumulation of nitrates that can be available to leach into the ground water. Principles for successful grazing include the following:

- ✓ Use short grazing periods for the pasture rotation schedule – longer than 3 days will cause re-growth to be grazed.
- ✓ Adjust rest periods as pasture growth rate changes.
- ✓ Fluctuate stocking rate to match carrying capacity annually and seasonally.
- ✓ Use the largest herd possible consistent with good animal husbandry.
- ✓ Use the highest stock density possible. Allowing manure to accumulate in low-lying areas where ponding occurs may leach nutrients into the ground water.

Recommended Management Practices

Follow the University of Idaho Cooperative Extension System accepted pasture and irrigation management practices to avoid overgrazing of pastures. Pasture maintenance and renovation, pasture rotation, and grazing management are included in their recommendations. Some basic practices are:

- ✓ Water animals away from natural water sources.
- ✓ Use a minimum 30-ft. buffer between calving/feeding area and riparian areas.
- ✓ Do not feed in proximity to a water course.
- ✓ Test soils annually.
- ✓ Practice proper manure management techniques for collecting, storing, and applying manure.

Appendix D provides more specific information.

D. Animal Feeding Operations

1. Introduction

The following recommendations are generally considered BMPs for AFOs, but do not limit the use of other practices that apply to a particular operation if the practice is effective. These practices can be implemented in combination to obtain the desired protection.

To manage waste effectively at AFOs, the following aspects of the operation need to be addressed: Surface Water Management; Waste Water Effluent Management; Solid Manure Management; and Management of Feed-yard Surfaces.

A substantial amount of information is available on AFOs in Appendix D.

2. Surface Water Management

Although precipitation in the Weiser Area is low, heavy rainfall or snow events can, at times, generate enough runoff water to cause a problem. Managing runoff water to minimize contact with manure and feed will reduce the amount of water that will need to be managed as effluent. Feed-yard operations should incorporate facility management techniques that will divert surface runoff and storm water away from the facility to prevent contact with manure and stored feed products. If surface and storm waters become contaminated by contact with manure and stored feed products, runoff should be diverted to the waste water effluent treatment site.

3. Waste Water Effluent Management

a) Lagoons and wastewater conveyance facilities are an important part of a feed-yard's wastewater effluent management. These facilities allow the capture, managed use, and disposal of surface water runoff, corral water, and process water mixed with manure or stored feed products.

b) New lagoons and wastewater conveyance facilities should be designed and constructed in accordance with state standards to minimize leakage of stored wastewater.

c) Existing lagoons and wastewater conveyance facilities should be redesigned and/or modified to meet state standards to minimize leakage of stored wastewater.

d) Lagoon water should be routinely analyzed to determine the nutrient levels.

d) Waste and water can be land applied to provide both the water and nutrient needs for a given crop. Follow the recommendations in the Agriculture portions of this plan.

e) BMPs or applicable regulations should also be followed when cleaning out sediments from lagoons and holding ponds to prevent damage to the seals or structures that could result in leakage.

f) Storage facility sediments should be managed as per recommendations in the Solid Manure Management section of this document.

See Appendix D for more information.

4. Solid Manure Management

Solid manure should be managed as a nutrient source for growing crops. Application of solids should follow the recommendations on fertilizing and irrigation practices outlined in the Section VI A.

Recommended Management Practices

- Store manure in a manner that minimizes impact to ground water.
- Routinely analyze the nutrient value of manure that is applied to crops.
- Test soils annually to determine current soil nutrient status and application requirements.
- Consult the Natural Resources Conservation Service (NRCS) or other agricultural field services to select a system of BMPs, including agronomic rates for manure application.
- Consider composting of solids as a method of managing the nutrients. Benefits include:
  - ✓ Stabilization of nutrients
  - ✓ Lower salt index
  - ✓ More consistent product
  - ✓ Pathogen and weed seed destruction
  - ✓ Reduced transportation costs

5. Management of Feed Yard Surfaces

Studies have shown that concentrating animals in a small area produces a surface seal of compacted organic matter and soil that inhibits movement and leaching of effluent through the seal. Beneficial biological/chemical reactions that reduce nitrogen may occur in the seal layer.

Recommended Management Practices

- Direct the drainage to adequately constructed effluent facilities.
- Maintain the surface seal while removing manure and scraping the feedlot pens.
- Maintain grades on existing corrals to provide drainage and prevent ponding within the corrals.
- Upgrade facilities to meet accepted BMPs.

Appendix D references more information available on this topic.

E. Ground Water Recharge

Ground water recharge, often referred to as "managed ground water recharge or artificial recharge", has been used in Idaho to offset the effects of declining ground water supplies. In periods of abundant surface water supply, such as during spring runoff, excess surface water is purposely diverted and controlled in a manner that promotes rapid infiltration through soil or bedrock into ground water, thus locally increasing the supply of ground water.

Ground water recharge has not been a significant issue in the Weiser Area. However, the Committee recognizes that certain land uses or man-made features indirectly increase the rate of ground water recharge beyond the rate that may occur in the absence of man's activities. Ground water recharge, whether intended or not, can have both beneficial and detrimental effects on ground water quality. Factors to consider in assessing the significance of ground water recharge include the following:

a) Water leakage from irrigation canals and ditches may recharge aquifers in certain areas.

b) Where leakage rates are high, surface water with relatively low levels of nitrate may dilute local ground water and reduce nitrate concentrations.

c) Rapid infiltration of surface water into near-surface ground water aquifers may increase the risk of introducing surface water microbial contaminants to nearby wells. Common surface water contaminants of concern include E. coli, Giardia lamblia, and Cryptosporidium.

Additional information is found in Appendix D.

Recommended Management Practices

No proposals for ground water recharge projects currently exist in the Weiser Area. If such projects are proposed in the future, the criteria for safe recharge should be developed jointly by IDEQ, IDWR, and ISDA.

F. Ground Water/Surface Water Interaction

1. Within the Snake River Basin, surface and ground water systems are commonly interconnected. Changes in ground water recharge or discharge have been observed to affect surface water flows (Klahr 1986). Similarly, infiltrating water from irrigation systems and stream flows represent a significant portion of the ground water budget (IDWR 2000).

2. Factors that have negatively affected both ground water and surface water quality include: runoff from impervious surfaces and roadways, fertilizers and pesticides, and septic system effluent.

3. The sedimentary aquifers of the Weiser Area are primarily recharged by irrigation water, stream leakage, and snow melt (Young, et al 1977).

4. Some streams of the area are deeply cut and channeled, with little natural meander. This allows for fast flows during runoff periods with little leakage to ground water, but the deepened channels do provide for easier escape of ground water to the streams.

Recommended Management Practices

- Encourage the development of projects to improve surface water quality, with the understanding that improved quality of surface water will have a diluting or flushing effect on ground water, thus improving ground water quality where surface water provides the main recharge to the aquifer.

- Encourage efforts to slow the flow of surface water and restore a natural meander, where such projects would increase the beneficial recharge potential of surface water to ground water.

- Provide educational materials to increase public awareness of the ground water/surface water interrelationship.

Section VII Implementation Tasks

A. General

1. The Committee will act as overall coordinator to encourage adoption of practices that will reduce nitrate loading to the ground water.

2. The Committee will encourage development of a physical characterization of the aquifer to determine the fate of nitrate in the aquifer.

3. Implementation Tasks, Section VII of this document, should be reviewed after each evaluation period by the Committee to determine if changes should be made to the plan.

4. Implementation will initially rely on education with an effort to gather information pertinent to practices and activities that will protect ground water quality. The assumption is that once businesses, organizations, governmental agencies, and individuals are aware of the environmental consequences of certain practices, they will seek alternatives to reduce ground water contamination. The following activities are recommended for plan implementation. All local, state and federal agencies are encouraged to coordinate efforts to implement the following activities.

    a) Education and Public Awareness

- Develop public information and education plans that emphasize ground water quality protection in the Weiser Area. Then, as resources allow, implement components of the plan.

- Design presentations or workshops that could be used to present ground water protection concepts to a variety of target audiences. Attempt to include ground water protection presentations in various forums attended by targeted audiences.

- Prepare and/or encourage the development of media articles addressing different aspects of ground water quality protection.

- Coordinate information with other entities, as appropriate, regarding other local water quality projects.

b) References and Resources (Appendix D of this document) – IDEQ will be the lead agency to update information.

c) Implementation Strategy – IDEQ will be the oversight agency leading implementation of this component with the assistance from local government agencies, individuals, businesses and organizations.

- Identify approved BMPs or implementation plans that would be useful for protection of ground water quality. Encourage the development and adoption of strategic plans by individuals, businesses, organizations and governments to protect the ground water quality.

- Gather, organize, and make available existing relevant information pertaining to practices and strategies that will protect ground water from contamination.

- Develop and implement specific plans that highlight the ground water concerns to be addressed, the practices that will be promoted and to address those concerns.

- Identify gaps in knowledge and develop plans for obtaining the information or research needed to fill those gaps.

d) Documentation of Results – IDEQ will be the lead agency for the implementation of this component, although other local government agencies, individuals, businesses, and organizations should be encouraged to participate.

- Develop a plan to document how well activities, practices, and alternative practices recommended in the Management Plan are being adopted. Include specifics on types of practices, geographic extent, location, time of adoption, continued use of recommendations, and other factors relevant to

document progress in implementing the action plan. This plan will be used to address the evaluation milestones in Section VIII.

Section VIII will determine the effectiveness of the above land-use implementation activities.

B. Implementation Funding

1. Minimal funding is currently available for implementing this management plan.

2. Although dedicated funds are not available, there are a number of grant funding sources and low-interest loans available for addressing certain aspects of the plan. These funding options have eligibility requirements, application procedures, and conditions for application. Most grants and loans are competitive in nature and proposed projects compete with other proposals submitted throughout the state or nation.

   Grant programs:

   a) Weiser River Soil Conservation District – State Revolving Fund

   a) Federal Clean Water Act – Section 319 (Nonpoint Source) administered by the Idaho Department of Environmental Quality (IDEQ).

   b) Idaho Soil Conservation Commission (ISCC)

   c) United States Department of Agriculture (USDA)

   d) Regional Environmental Protection Agency (EPA – Region X)

   e) Idaho Department of Commerce (IDOC) – Low-interest loans

   f) Idaho Soil Conservation Commission (ISCC)

   g) Idaho Department of Environmental Quality (IDEQ) – State Revolving Loan Program

   Those wishing to pursue a project implementing some aspects of this management plan are urged to coordinate efforts with the lead agencies and the Committee. A funding committee may be formed for this project.

   For additional information on grants and loans see Appendix D.

3. Ultimately, grants and loans can only cover a small portion of the activities needed to make the necessary changes to improve the ground water quality. In the end, successful implementation of this plan will rely on individuals, organizations, businesses, and governmental agencies taking the initiative to incorporate the concepts presented here into their new or existing practices.

4. IDEQ will send letters to pertinent local businesses and organizations regarding the existence of the plan. The Committee encourages all organizations that provide advice to area residents and businesses about water to incorporate the concepts on protecting ground water quality in their recommendations to their clientele. Businesses and private organizations are encouraged to support efforts to implement this action plan and adopt the activities and practices to protect the ground water from contamination. IDEQ will also provide funding and support activities outlined in the action plan. Internal resources will be used to support activities recommended in the management plan.

C. Agriculture

1. Education/Demonstration

Develop educational programs and demonstration projects designed to familiarize growers with the recommendations made in Section VI A and encourage adopting practices aimed to prevent the leaching of nitrate to ground water.

a) Survey local growers on currently used practices to determine a baseline of practices and, at the same time, highlight practices the advisory committee is recommending for use in the county.

b) Using this document and other references, coordinate and assist the agricultural community in the following ways:

- Identify practices that reduce or eliminate nitrate loading to the ground water.
- Determine whether recommended practices are being used and applied correctly.
- Determine the levels and variance of nitrate at different depths in the soil profile under agricultural fields in the area. Recommend appropriate methods and sample sizes for growers to account for variations in the field. Promote an increased understanding of the variation in practices and nutrient requirements across agricultural fields.
- Evaluate whether nutrients leach out of the soil profile during certain times of the year.
- Determine the nutrient requirements for each stage and given yields for crops most commonly grown in the county.

2. Publicity

Familiarize the agricultural sector with the reasoning behind the management plan and encourage use of recommended management practices with presentations on ground water quality protection at appropriate local forums.

3. Reference Materials

Develop an inventory of reference materials, guidance documents, and articles that recommend management practices and strategies aimed at reducing nitrate loading for targeted crops and conditions in the Weiser Area. Appendix D provides some references.

4. Funding

Target grant applications and other assistance funds to implement recommended management practices and strategies.

Support funding activities that develop and demonstrate the use of BMPs and strategies for the protection of Weiser Area's ground water resources. Compile the BMP and strategy information for future use.

D. Industrial/Municipal Wastewater Land Application Areas

Implementation will rely on the current permitting practices of IDEQ with input from the land appliers. The permittees will strive to address the intent of the laws and regulations established for environmental protection, by following permit conditions and meeting or exceeding all requirements. Additionally, appliers will commit to the continued use of the Operation and Management Plans and Monitoring Plans required by their permits.

E. Residential

1. General

a) Publicity – Develop appropriate articles and newsletters for local publication and media outlets. Emphasize and encourage the adoption of recommended practices aimed to reduce nitrate loading to ground water.

b) Information – Develop and establish an educational/outreach program and material to provide the residential community with information and alternatives on methods to develop property while protecting ground water quality. Encourage local area libraries to house information for he public. Investigate availability of bilingual material.

c) Public meetings – Integrate a ground water quality component into the local area educational forums (such as: Water Awareness Week, 4H, FFA and Scouts).

d) Local surveys – Conduct surveys of local residents at local community events or in conjunction with a nitrate testing program to determine awareness of the ground water quality concerns and problems in the area.

e) Real estate transactions – Develop brochures for real estate agents, brokers, title companies, and building departments about ground water quality concerns, suggested mechanisms, and BMPs.

2. Septic Systems – Implementation Activities

a) Southwest District Health and County Planning Departments – Research and provide recommendations to address present and future development.

- Encourage placement of sewage disposal absorption drainage fields to maximize nutrient uptake by surface vegetation.

- Adhere to the policy requiring developers of proposed high density/small acreage subdivisions to conduct nutrient-pathogen studies within the Weiser Area.

b) Southwest District Health

- Encourage the public to perform routine maintenance on septic systems to extend life of the system and minimize ground water impacts.

- Encourage citizens to periodically inspect, replace or upgrade septic systems to meet current standards.

c) City and County Governments and Planning Departments –

- Review Land-Use Plans and Codes to determine incorporating ground water quality as criteria in land-use review for proposed development.

- Develop a long-term municipal sewer system plan.

- Connect residences to the municipal system, when possible.

3. Landscape, Lawn and Garden – Implementation Activities

a) Home*A*Syst, coordinated by Idaho State Department of Agriculture, provides information on environmental and health issues around the home.

b) Master Gardener Program, University of Idaho Cooperative Extension System, can help organize information and develop an educational/outreach program for

methods and alternatives to maintain landscaping, lawns, and gardens to prevent nitrate leaching to the ground water.

4. Wells – Implementation Activities

IDWR and can provide the following assistance:

- Develop and distribute information to well drillers and the public about the ground water contamination concerns in the county.
- Outline the need to construct and repair wells to prevent possible contamination from the surface.
- Highlight the need to repair wells that are connecting aquifers to prevent cross-contamination of aquifers.
- Encourage wells to be constructed according to the Idaho Department of Water Resources Well Construction Standards, IDAPA 37.03.09.

5. Animal Pastures – Implementation Activities

University of Idaho Cooperative System Extension can develop informational/ educational materials introducing BMPs for animal pastures aimed to protect ground water.

F. Animal Feeding Operations

1. IDEQ, IDWR, Soil Conservation Commission and Districts, University of Idaho Cooperative Extension System, and ISDA – The Committee envisions numerous tasks that will be accomplished by these agencies:

a) Resources

- Review scientific literature and studies regarding ground water quality management of AFO operations.
- Review research and identify BMPs that will address waste management problems within AFOs.
- Develop informational/educational materials for AFO operators introducing BMPs aimed to protect ground water.
- Develop and maintain a bibliography of literature on AFO BMPs.

b) Technical assistance can be provided by a number of resources:

- Develop a plan that will clarify the science with regard to ground water quality and the management of AFOs for public education.

- Develop and maintain a list of individuals and agencies with technical expertise in the design, construction, and operation of AFOs.

- Provide evaluations for individual AFOs to assess their ground water protection measures.

G. Ground Water Recharge

Currently, no proposals for ground water recharge projects exist in the Weiser Area. If recharge projects are proposed in the future, the criteria should be developed jointly by IDEQ, IDWR, and ISDA.

H. Ground Water/Surface Water Interaction

Provide educational material aimed at increasing public awareness of ground water/surface water interrelationship.

Encourage the development of projects to improve surface water quality. Surface water has a diluting or flushing effect on ground water, thus improving ground water quality where surface water provides the main recharge to the aquifer.

Encourage efforts to slow the flow of surface water and restore a natural meander, where such projects would increase the beneficial recharge potential of surface water to ground water.

Section VIII Evaluation of Management Plan Progress and Success

A. Introduction

1. The primary goal of this plan and the Ground Water Quality Rule is to reduce the contamination of nitrate in the aquifer so that the area is no longer on the statewide nitrate priority list. (Development of this list is explained in Section I.)

2. Due to the slow nature of ground water movement, it is not anticipated that quantitative reductions in nitrate levels will occur during the early implementation of the plan. Therefore, qualitative measures will also be established to evaluate the progress and success of the plan in the short term (3 – 5 years).

3. Once the plan is in place and has been implemented, the Committee recommends the proposed schedule on page 39 to evaluate the progress made in reducing nitrate contamination of the ground water.

4. Another goal of the plan is to educate residents on the presence of arsenic, which occurs in the ground water in the area and may cause health risks.

B. Annual Progress Report

1. A compilation of findings from federal, state, and local agencies will be made each year. The IDEQ, with the support of the Committee, will be the lead entity to compile and provide this information.

2. Additionally, every four years, an extensive review and evaluation of the effectiveness of the plan will be completed as a joint effort among the agencies. The first review would be scheduled for 2007.

C. Proposed Schedule

1. By the end of the first year (February 2004) – The plan should be endorsed and adopted by local government and support agencies, as well as the general public.

2. At four years (2007) – The success of this management plan will be based on whether strategies and plans have been developed, after the first four years, as outlined under the Implementation Tasks Section VII. The qualitative evaluation will assess whether the appropriate institutions promoted the plan recommendations, and will include the documentation of activities, practices and alternatives that have been adopted to reduce nitrate loading to the ground water.

3. At eight years (2011) – A rough quantitative evaluation will be performed after eight years to document the trend of nitrate levels since implementation of the plan. A qualitative evaluation will determine whether the protection strategies are still being promoted and what percentage of the citizens, businesses, and other organizations are participating in the plan.

4. Every four years thereafter – Both a qualitative and quantitative evaluation of the plan's progress and success will be made to document improvements in ground water quality in the county. If no improvements are noted, regulatory activities may be initiated per the Ground Water Rule (IDAPA 58.01.11.400.02). These activities will be a joint effort between IDEQ, ISDA, SCDH, IDWR and this committee.

   See Appendix D for internet address to the Ground Water Rule.

5. At each step, the Committee and governmental agencies will need to determine whether this management plan is addressing the ground water contamination concerns adequately or whether modifications need to be made to the plan to better enable success.

D. Qualitative Evaluation

1. The intent of a qualitative evaluation is to demonstrate that management practices and strategies aimed to reduce nitrate loading to ground water have been developed and implemented. The new practices, activities, and strategies will,

given time and an increasing adoption rate of the beneficial practices, result in better ground water quality.

2. The following shall be part of the four year qualitative evaluation:

a) Conduct surveys and develop a summary description of the practices, activities, and strategies being used that reduce nitrate loading to ground water.

b) Document the extent of changes and adoption of ground water quality protection practices, activities, and strategies that are recommended in this plan.

E. Quantitative Evaluation

1. The ultimate goal of this management plan and the Ground Water Protection Act is to reduce the concentration of nitrate in the aquifer. Specifically, the goal is to reduce nitrate levels in order to be able to remove the Weiser Area from the statewide priority list, as explained in Section I.

2. The ISDA (Ground Water Program) and IDWR (Statewide Ambient Ground Water Quality Monitoring Program) will continue to sample for nitrate on a regular basis.

Figures showing these well locations are in Figure 1, page 7.

3. The determination of the success of this management plan will depend on:

a) The results of on-going trend analyses, based on statistical analysis of monitoring results from the state monitoring networks.

b) Evaluation of nitrate changes along several ground water paths from up-gradient sites to downgradient sites.

4. The Committee will work with IDEQ, IDWR, SWDH, and the ISDA to evaluate other factors associated with a reduction in nitrate loading to ground water (for example, long term trends in nitrate levels of shallow and deep soil samples).

5. IDEQ will assist the Committee and other state agencies to evaluate the data.

F. Audience

1. Reports should be targeted for two audiences:

a) Residents within the Weiser Area and Washington County – The public in the Weiser Area should be the primary audience. The report should act as an educational tool about nitrate and as a useful reference for the practices, activities, and strategies being promoted to protect ground water quality in the Weiser Area and throughout Washington County.

b) State agencies and the interested public outside of the Weiser Area and Washington County – IDEQ, IDWR, SWDH, and ISDA, and interested parties outside the state should be able to use the report to demonstrate to the public that the nitrate concern is being addressed in the area. The report should also:

- Determine whether the plan is being implemented in such a manner that the nitrate concentrations will be reduced in the future.
- Document what practices, activities, and/or strategies have been implemented and to what extent.
- Identify what changes to the management plan would better address the nitrate impacts to the ground water.

G. Management Plan Evaluation Milestones

In order to evaluate the progress and success of the plan, a schedule has been proposed by the Committee. Details of the data evaluation and review dates are discussed in item C of this section, Proposed Schedule, found on page 39. A simplified version of this same information is provided on the following page.

Table 2: Management Plan Evaluation Milestones

Land Uses	Time Frame – Years Baseline	2006	2010	2014	Goals %	Topic Addressed	Responsible Party
Agriculture	X					Acres assessed for GW quality protection measures-type of irrigation & fertilizer management.	U of I, NRCS, ISDA, ISCC, and SCD
		X			50	% of acres in the area that are implementing an accepted system of BMPs.	
			X		75		
				X	90+		
Residential	X					Determine initial public awareness of elevated nitrate in ground water, and its possible causes.	Local Gov't. SWDH & IDEQ
		X			50	Half of the area residents surveyed are aware of elevated nitrate levels in the ground water and know of at least one potential contributor. A large percentage of residents have made practice improvements (50% by 4 yrs., and 75% by 8 yrs.). Septic system nitrate loading issues (including high density areas and cumulative effects) have been investigated and addressed in terms of permits or practices.	
			X		75		
				X	90+		
Industrial/ Municipal Wastewater Land Application	X					Land appliers will sample existing monitoring wells per the existing permits. Nitrate analysis of monitoring wells will likely be added to permits as they are re-issued. Trends of the nitrate levels will be compiled.	Permitees & IDEQ
		X			75		
			X		85		
				X	95+		
Ground Water Recharge						No ground water recharge activities at this time.	IDEQ, IDWR, and ISDA
Ground Water/ Surface Water Interaction						Educational outreach to be listed in the annual reports.	U of I, NRCS, ISDA, ISCC, and SCD
Animal Feeding Operation	X					As of this printing, all dairies are required to have nutrient management plans and are implementing them (July 1, 2001). The beef industry is to have nutrient management plans by Jan. 2005.	U of I, NRCS, ISDA, ISCC, and SCD
		X			50	Percent of confined animals that are under an accepted system of BMPs. All dairies and the beef industry should be following their Nutrient Management Plan.	
			X		75		
				X	95+		

ACRONYMS

AFO	Animal Feeding Operation
BMP	Best Management Practice
Committee	Weiser Area Ground Water Advisory Committee
EPA	United States Environmental Protection Agency
FFA	Future Farmers of America
FSA	Farm Service Agency
IASCD	Idaho Association of Soil Conservation Districts
IDEQ	Idaho Department of Environmental Quality
IDOC	Idaho Department of Commerce
IDWR	Idaho Department of Water Resources
IRWA	Idaho Rural Water Association
ISCC	Idaho Soil Conservation Commission
ISDA	Idaho State Department of Agriculture
NPDES	National Pollution Discharge Elimination System
NRCS	Natural Resources Conservation Service
SCD	Soil Conservation District
SWCD	Soil and Water Conservation District
SWDH	Southwest District Health
TMDL	Total maximum daily load
U of I	University of Idaho
USDA	United States Department of Agriculture Agency

Glossary

Animal Feeding Operation (AFO) – The holding of any number of animals in buildings, pens, or lots.

Agricultural activity/Agriculture – Any activity conducted on land or water for the purpose of producing an agricultural commodity, including crops, livestock, trees, and fish.

Ambient – The best-assumed level of water quality prior to human land use activities.

Anti-backflow (anti-backsiphoning) device – A check valve or other mechanical device to prevent the unwanted reverse flow of liquids back down a water supply pipe into a well.

Aquifer – A geological formation of permeable saturated material, such as rock, sand, gravel, etc., capable of yielding economically significant quantities of water to wells and springs.

Arsenic – A dissolved metal that is most commonly a naturally occurring contaminant in the ground water in Idaho. The MCL for arsenic is 0.01 mg/l.

Artificial recharge – The process by which water can be added to an aquifer by man. Dug basins, drilled wells, or the spreading of water across the land surface are all means of providing artificial recharge.

Background concentration – is defined in two different ways:

- Natural background ground water quality – The ground water quality unaffected by man.

- Site background ground water quality – The ground water quality directly upgradient of a site.

Beneficial uses – Various uses of ground water in Idaho include, but are not limited to, domestic water supplies, industrial water supplies, agricultural water supplies, aquacultural water supplies, and mining. A beneficial use is defined as an actual current or projected future use of ground water.

Best management practice (BMP) – A practice or combination of practices determined to be the most effective and practical means of preventing or reducing contamination to ground water and/or surface water from nonpoint and point sources in order to achieve water quality goals and protect the beneficial uses of the water.

Chemigation – Adding a chemical to an irrigation system for distribution to the crops.

Coliform – A type of bacteria found in water that, when present in drinking water, carries the risk of spreading a water-borne illness.

Compost – A biologically stable material derived from the biological decomposition of organic matter.

Constituent – an element or component.

Contaminant – Any chemical, ion, radionuclide, synthetic organic compound, microorganism, waste or other substance that does not occur naturally in ground water, or a constituent that occurs naturally that may cause health concerns.

Crops needs – Factors required by a crop in order to grow, such as water, nutrients, and sunlight.

Crop root zone – The zone that extends from the surface of the soil to the depth of the deepest crop root and is specific to a species of plant, group of plants or crop.

Crop uptake – Water and nutrients actually used by the crop.

Degradation – When a numerical ground water quality standard has been exceeded.

Denitrification – The volatilization of nitrate into nitrogen gas, which dissipates into the air.

Effluent, solid or liquid – Any waste material moving away from its point of origin.

Fertilizer – Any substance containing one or more plant nutrients utilized to enhance plant nutrient content and/or for promoting plant growth.

Ground water – Any water that occurs beneath the surface of the earth in a saturated geological formation of rock or soil.

Ground Water Quality Rule – Values, either numeric or narrative, assigned to any contaminant for the purpose of establishing maximum levels or protection.

Infiltration rate – The rate at which water infiltrates or seeps into the soil.

Injection well – The subsurface emplacement of fluids. The purpose of injection by Class V wells is the temporary or permanent disposal or storage of fluids into subsurface geologic formations.

Irrigation water management – Determining and controlling the rate, amount and timing of irrigation water in a planned and efficient manner.

Leach – To dissolve nitrogen (or other constituents) in water, potentially enabling these constituents to reach the ground water.

Legume – Crops having nodules on the roots containing bacteria that are able to convert nitrogen in the air into a usable form for the plant.

Liquid manure – A mixture of water and manure that can be pumped, generally less than 10 percent solids.

Livestock wastes – A term sometimes applied to manure that may also contain bedding, spilled feed, water or soil. It also includes wastes not particularly associated with manure, such as milking center or washing wastes, milk, hair, feathers or other debris.

Local government – Cities, counties and other political entities of the state.

Manure – The fecal and urinary excretions of livestock and poultry.

MCL (Maximum Contaminant Level)- The maximum level a contaminant is considered safe for human health as determined by the U.S. Environmental Protection Agency.

Mg/L (Milligrams per liter) – The weight of a substance measured in milligrams contained in one liter.

Mineralization – Increases in concentration of one or more inorganic constituents resulting from contact of ground water with geologic formations.

Nitrate – A common contaminant identified in ground water that is a crop nutrient. It is a component in fertilizer, is found in wastes at the soil surface, and occurs naturally in the soil, through a process such as mineralization of organic nitrogen. The MCL for nitrate is 10 mg/l.

Nitrification – Microbial oxidation of ammonia to nitrate.

Nitrogen-fixing crop – A crop that is able to take nitrogen from the air and convey it to microorganisms in soil for consumption.

Nonpoint source – A contaminant or pollutant released in a diffuse manner of entry into a water body so there is no identifiable or specific point of entry.

Nutrient – Any substance applied to the land surface or to plants that is intended to improve germination, growth, yield, product quality, reproduction, or other desirable characteristics of plants.

Nutrient management – Managing the amount, form, placement and timing of the plant nutrient applications.

Nutrient management plan – A plan for managing the amount, placement, form and timing of the land application of nutrients and soil amendments.

Nutrient-pathogen study – A study whose primary purpose is to determine the linkage between nutrients and pathogens, particularly how they enter surface water or ground water.

Organic matter – Substances of biological origin that contain carbon-decaying cells of plants, microorganisms, or small animals.

Organic nitrogen – A form unavailable to plants until the mineralization process takes place. Most of this type of nitrogen is bonded to carbon in living and decaying cells of plants, microorganisms, or small animals.

Point source – A contaminant or pollutant, often released in concentrated form, from a conveyance system or discrete source, such as from a pipe, into a body of water.

Pond – A water impoundment made by constructing a dam or an embankment or by excavating a pit or dugout.

Process water – Water used in a facility or an AFO that cleans equipment, the facility, or animals.

Public Water Systems – Serves at least 15 service connections used by year-round residents or regularly serves a population of at least 25 year-round residents.

Qualitative evaluation – A chemical analysis designed to identify the components of a substance or mixture.

Quantitative evaluation – A chemical analysis designed to determine the amounts or proportions of the components of a substance or mixture.

Recharge area – An area in which water infiltrates the soil or geological formation through precipitation, irrigation practices, and/or seepage from creeks, streams, lakes, etc., and percolates into one or more aquifers.

Residual nitrogen/nutrients – Residual or unused nitrogen remaining in the soil after a crop is harvested.

Root zone – The zone within a soil profile where the roots predominate, normally at 0 – 9 inches of soil depth.

Soil characteristics – Parameters, often generated from lab tests, used to describe or quantify the basic characteristics of a soil.

Soil profile – A vertical section of soil delineating the distinct horizontal layers of various soils and geologic formations in a given area.

Solid manure storage – A storage facility in which accumulations of bedded manure or solid manure are stacked before subsequent handling and field spreading.

Total maximum daily load (TMDL) – Determinationof water bodies capacity to support beneficial uses.

Volitilization – The dissipation of gaseous components, such as ammonium nitrogen, from animal manure or other substances.

Waste storage pond – An impoundment made by excavation or earthfill for temporary storage of industrial or agricultural waste.

Waste treatment lagoon – An impoundment made by excavation or earthfill to biologically treat industrial or agricultural waste.

Wastewater – Process water after use within a facility or AFO; the water is usually treated prior to disposal.

Water quality – The excellence of water in comparison with its intended use or uses.

Well bore – The actual hole dug by a well drilling rig.

Well cap – A manufactured device installed at the top of a well casing that creates an airtight and watertight sanitary seal to prevent surface water and contaminants from infiltrating the ground water supply.

Wellhead – The physical structure, facility, or device at the land surface from or through which ground water flows or is pumped from subsurface water-bearing formations.

Appendices

Appendix A - Management Plan Support and Approval

A. Statement by the Committee

The Idaho Department of Environmental Quality (IDEQ), together with concerned residents, formed the Weiser Area Ground Water Quality Advisory Committee in the Fall of 2001 to address elevated levels of nitrate in the area's ground water. Members of the Committee participated based on their individual interests, talents, and areas of expertise. A Technical Advisory Committee, composed of governmental agency scientists and private business people, presented numerous educational sessions to the group.

With this additional knowledge, the Committee was able to identify potential activities that contribute to nitrate in ground water. Work sessions over the next several months resulted in the development of practices, activities, and strategies designed to reduce the amount of nitrate reaching the ground water. These suggestions, when added to the legal and scientific information, are referred to as the "Weiser Area Ground Water Quality Management Plan".

We, as a collective, approve of this document and strongly recommend its adoption by our fellow citizens.

The Weiser Area Ground Water Advisory Committee

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Chairperson Date

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Co-Chairperson Date

B. Concurrence with Management Plan

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City of Weiser Mayor Date

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Washington County Board Chairperson Date

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Idaho Soil Conservation Commission Administrator Date

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Weiser River Soil Conservation District Chairperson Date

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Idaho State Department of Agriculture Director Date

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Southwest District Health Department Director Date

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Idaho Department of Water Resources Director Date

C. Acceptance of Management Plan

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Idaho Department of Environmental Quality Director Date

Appendix B – Committee Members

Weiser Area Ground Water Quality Advisory Committee Members

Terry Baskett – Champion Homes
Jack Brown – Farmer, Committee Vice Chairperson
Randy Brown – Citizen
Lorraine Carr – Citizen
Art Correia – Citizen
Brad Hansen – City of Weiser
Wayne Laird – Washington County P & Z
Dennis Lance – Weiser P & Z, Committee Chairperson
Ned Law – Citizen
Ron Pound – Citizen
Joe Qualls – City of Weiser Water Department
Sid Roberts – Citizen
Donna Servatius – Washington County P & Z
Ester Smith – Citizen
Jeri Soulier – Washington County P & Z
Frank Stirm – Washington County Commissioner
David Thomas – Citizen
Diana Thomas – Washington County Commissioner
Kathleen Tuttle – Citizen
Kenneth Uhrig – Citizen

Technical Advisory Committee

Idaho Association of Soil Conservation Districts – Lance Holloway
Idaho Department of Water Resources – Ed Hagan
Idaho State Department of Agriculture – Gary Bahr, Rick Carlson
Idaho Department of Environmental Quality – Phil Bandy, Linda Boyle, Robbyn Freeman, Mike Thomas, Tom Neace, Toni Mitchell
Natural Resources Conservation Service – Tom Yankey
Soil Conservation Commission – Tony Bennet
Southwest District Health Department – Jeff Batten
University of Idaho Extension Service – Kristin Keith, Steve Reddy
Weiser River Soil Conservation District – Vicki Lukehart

Presenters

Bill Allred, Idaho Department of Environmental Quality
Gary Bahr, Idaho State Department of Agriculture
Jeff Batten, Southwest District Health Department
Linda Boyle, Idaho Department of Environmental Quality
Don Burton, Meridian Plumbing & Water
Rick Carlson, Idaho State Department of Agriculture
John Chatburn, Idaho State Department of Agriculture
Catherine Chertudi, City of Boise
Jessica Fox, Idaho State Department of Agriculture
Jeff Fromm, Idaho Department of Environmental Quality
Ed Hagan, Idaho Department of Water Resources
Lance Holloway, Idaho Association of Soil Conservation Districts
Rob Howarth, Idaho Department of Environmental Quality
Scott Jensen, U of I Extension Service
Dennis Lance, Weiser Resident Geologist
Toni Mitchell, Idaho Department of Environmental Quality
Marilyn Moore, Malheur County Extension Service
Bruce Otto, Idaho Water Resources Research Institute
Joe Qualls, City of Weiser Water Department
Dale Ralston, Idaho Water Resources Research Institute
Phil Richardson, Oregon Department of Environmental Quality
Tom Yankey, Natural Resources Conservation Service

Appendix C - Duties, Roles, and Responsibilities

The following is a brief description of the roles and responsibilities of the participating agencies and organizations.

A. Weiser Area Ground Water Quality Advisory Committee (the Committee)

The Committee volunteered in assisting the State of Idaho (represented by the Idaho State Department of Agriculture and the Idaho Department of Environmental Quality) in developing and implementing a ground water quality management plan. Following approval (by ISDA, City of Weiser, IRWA, ISCC, Weiser River Soil Conservation District, and SWDH) and adoption of the plan (by IDEQ), the Committee will meet periodically to review the implementation of the management plan.

The Committee may establish subcommittees as necessary to implement portions of the plan. These subcommittees may periodically review and report plan implementation progress to the full Committee. The Committee will review these reports and provide recommendations for plan revisions to local governments, state, and federal agencies.

Subcommittees:

- Agriculture
- Wastewater Land Application
- Residential
- Animal Feeding Operations
- Ground Water Recharge
- Ground Water/Surface Water Interaction

B. United States Department of Agriculture – Natural Resources Conservation Service (NRCS)

The NRCS activities include working with the Weiser River Soil Conservation District to implement technical and financial assistance programs related to soil and water resources. After formal research and development of BMPs, the NRCS, in cooperation with FSA, IDEQ, and ISDA, will perform public, group, and individual demonstration projects to ensure the acceptance of the established BMPs by industry and the community. NRCS, in cooperation with FSA and Weiser River Soil Conservation District, shall provide technical and financial assistance. Land operators will benefit from this assistance in the planning and implementation of nutrient, pest control, and irrigation management plans designed to protect ground water and surface water quality with "best management systems."

C. Weiser River Soil Conservation District

Primary activities of the Weiser Soil Conservation District include soil erosion control; conservation and development of water resources; control of water pollution from agricultural nonpoint sources; and protection, conservation, development, and enhancement of the quality

and productive potentials of land and water resources in Idaho. The Weiser River Soil Conservation District is administered and coordinated by the Idaho State Department of Agriculture (ISDA).

The Weiser River Soil Conservation District shall promote, assist, and encourage landowners in addressing and implementing this action plan. The Weiser River Soil Conservation District may develop work plans, compile and issue reports, and assess implementation of the management plan to the ISDA and IDEQ.

For the action plan, the Weiser River Soil Conservation District will coordinate recommended implementation activities in the action plan. The Weiser River Soil Conservation District will establish schedules for plan renewals, respond to plan applications, monitor voluntary compliance actions, provide technical assistance, act as a clearinghouse for ground water protection information, identify priority area activities, and develop and present water quality protection education programs.

D. Idaho Department of Water Resources (IDWR)

The IDWR administers surface and ground water programs and activities predominately related to water supply issues. However, the IDWR also has responsibilities for ground water quality in areas such as Statewide Monitoring, Managed Recharge, and Injection Wells. Programs conducted by IDWR affect ground water management and protection and are designed to ensure that water is used efficiently and without waste.

IDWR can assist with this ground water management plan in the following ways:

- Continue to conduct hydrogeologic characterization studies.
- Continue to enforce well construction standards and determine if stricter standards are needed.
- Ensure proper regulation and distribution of water in accordance with water rights and allocation.
- Recommend solutions where ground water quality problems exist or may be emerging.

IDWR shall cooperate with, and assist, other agencies involved in the planning and implementation of measures designed to protect the ground water quality and improve the efficiency of water use in the Weiser Area.

E. Idaho Rural Water Association (IRWA)

The IRWA has circuit riders that are available to meet with operators and managers at their public drinking water system to provide technical support. Assistance is provided for complying with federal and state mandates in maximizing the efficiency of the system, ensuring system capacity, and in addressing environmental challenges.

An IRWA Wellhead Protection Specialist can assist public drinking water systems in designing and implementing ground water protection plans. A protection plan initiates measures at the local level to prevent contamination, prevent noncompliance with the safe Drinking Water Act, lessen the burden on consumers, and prevent the degradation of drinking water for future generations. The City of Weiser has completed and made available their Ground Water Protection Plan.

F. Idaho State Department of Environmental Quality (IDEQ)

The IDEQ administers the Idaho State Ground Water Quality Protection Act and implements the ground water quality protection requirements for federal and state agencies, cities, counties, industry, and citizens. The IDEQ has the following responsibilities:

- Assist in developing a regional ground water monitoring network and performing periodic water quality assessments to evaluate the performance of the management action plan in reducing the ground water contamination resulting from the identified sources of contamination.

- Establish monitoring requirements to determine water quality conditions; establish and coordinate local monitoring efforts to obtain information on ground water quality.

- Work in conjunction with the Committee, ISDA and other state and local agencies to periodically evaluate and assess the implementation of the action plan and to determine whether the plan is effective in reducing nitrate loading to the ground water. Also to assist the Committee as requested.

- Administer rules and regulations for the permitting of land application of wastewater. The IDEQ will continue to work with permittees to protect the state's ground water resources.

- Carry out the provisions of the federal Safe Drinking Water Act by establishing drinking water standards, certifying water and treatment systems, and operators. IDEQ is responsible for identifying health hazards and issuing public notification on such hazards.

- Perform risk assessments concerning ground water quality and provide for the regulation and protection of all public water supplies within the management area.

G. Idaho State Department of Agriculture (ISDA)

The ISDA is the lead state water quality agency to implement agricultural laws and rules, water quality management and planning, engineering and technical services, monitoring, permits, and education and licensing efforts related to agriculture. The ISDA implements the Agricultural Ground Water Quality Protection Program for Idaho and the Agricultural TMDL Implementation Monitoring Program. The ISDA is also responsible for the regulation of the State Pesticide Management Plan, which includes pesticide

registrations, pesticide certification and training, pesticide enforcement, waste pesticide disposal and container recycling programs, urban pesticide programs, pesticide endangered species reviews, and pesticides and water quality programs, in addition to the regulation of fertilizers, soil and plant amendments, and dairy and feedlot facilities.

The ISDA is involved with the identification of existing agricultural management practice problems and in the development and implementation of alternative practices. The ISDA networks with the Soil Conservation Commission and Soil Conservation Districts to provide technical and financial assistance to farmers for conservation projects, research and demonstration projects, and public education and information.

The ISDA will continue to implement the Washington-Payette Counties Regional Ground Water Quality Monitoring Project, and conduct agricultural BMP monitoring evaluations to determine ground water impacts.

The ISDA will work with IDEQ to review and evaluate the effectiveness of the implementation of the agricultural elements of the action plan.

H. Idaho Soil Conservation Commission (ISCC)

The ISCC provides administrative, financial, and technical support to all of the Soil and Water Conservation Districts in the state, including the local offices in the Weiser Area. The ISCC and Weiser River Soil Conservation District develop annual work plans, review and evaluate district projects, practices, budgets, and contracts, and assist districts in meeting their obligations.

I. City and County Governments

In general, local governments are not involved with environmental regulation of agricultural practices, food processing, or confined AFOs. The Washington County Planning and Zoning (P & Z) Commissioners and the Washington County Board of Commissioners are, however, directly involved in rural residential and agricultural land use. County P & Z administrators and building inspectors issue building permits to build on land and enforce code provisions. The Washington County P & Z Commission reviews land partitions, subdivision proposals, requests to rezone properties, and special use permits, and makes recommendations to the Washington County Board, as well as makes suggestions for amendments to the county comprehensive plan. The role of local government is to educate the public about ground water quality concerns and planning for development compatible with the protection of ground water.

Appendix D – Available Resources

Rules, codes, acts, and standards (Rules):

Rules – State of Idaho

Topics: Ground water protection, well construction standards, well driller licensing rules, well abandonment rules, surface water rules, ground water rules, and links to state agencies.

http://www.oneplan.org

http://www.state.id.us/adm/adminrules/rules/idapa58/0111.pdf

http://www.state.id.us

Agriculture (Ag):

Ag 1. Idaho Association of Soil Conservation Districts (IASCD)

Topics: Programs (Soil Conservation Districts, TMDLs, Envirothon, Idaho State Forestry Contest, Home*A*Syst, Lake*A*Syst), conferences, and numerous web links.

(208) 338-5900

http://www.iascd.state.id.us

Ag 2. Idaho Soil Conservation Commission (SCC)

Topics: Programs to improve the environment, identify water quality issues and solutions, and provide access to technical information on resource management and technical assistance.

(208) 322-8650

http://www.scc.state.id.us

Ag 3. Idaho State Department of Agriculture (ISDA)

Topics: Pesticide programs, pesticides and water quality program, regional and local agricultural ground water and surface water monitoring, fertilizers, soil and plant amendments, dairy and feedlot facilities regulation, nutrient management planning with dairies and beef CAFOs, engineering and technical services, animal health, aquaculture, weed management.

(208) 332-8500

http://www.agri.state.id.us

Ag 4. United States Department of Agriculture – Natural Resources Conservation Service

Topics: Pollution prevention, fertilizer use, conservation practices, and watershed management.

(208) 549-4250

http://www.ftw.nrcs.usda.gov/tech_ref.html

http://www.nhq.nrcs.usda.gov/PROGRAMS/ahcwpd/ahCNMP.html

http://id.nrcs.usda.gov

http://www.wcc.nrcs.usda.gov/watershed/products.html

http://www.stormwatercenter.net

Ag 5. United States Environmental Protection Agency (EPA)

Topics: Fertilizer use, ordinances, source water protection, and small quantity chemical users.

(208) 378-5746

http://www.epa.gov/r5water/ordcom

http://www.epa.gov/owow/nps/ordinance

http://www.epa.gov/owow/nps/ordinance/links.htm

http://es.epa.gov/oeca/main/compasst/index.html

Ag 6. Washington County Agriculture Extension

Topics: Irrigation and soil fertility BMPs.

(208) 414-0415

http://extension.ag.uidaho.edu/washington/

Ag 7. Weiser River Soil Conservation District

Topics: Programs to improve the environment, water quality issues and solutions, access to technical information on resource management, and technical assistance.

(208) 549-4280

Wastewater Land Application (WWLA):

Idaho Department of Environmental Quality – Boise Regional office

Topics: Local information and permits.

(208) 373-0550

http://www.deq.state.id.us/water/water1.htm/

http://www.deq.state.id.us/ro_t/maintro.htm

Residential (res):
(refer to the Agriculture and AFO sections for information on animal pastures, lawn and garden care)

Res 1. Home*A*Syst/Farm*A*Syst

Topics: Environmental and health issues around the home.

http://www.uwex.edu/homeasyst

Res 2. Idaho Department of Environmental Quality

Topics: Drinking water, ground water, source water, surface water, and TMDLs.

(208) 373-0550

http://www.deq.state.id.us/water/water1.htm

Res 3. Idaho Department of Water Resources (IDWR)

Topics: Statewide Ground Water Quality Monitoring Program, well construction, water rights, and water distribution programs.

(208) 327-7900

http://www.idwr.state.id.us/

Res 4. Idaho Rural Water Association (IRWA)

Topics: Technical assistance for source water and wellhead protection for rural water systems and rural wastewater systems.

(208) 343-7001 or 1-800-962-3257

http://www.idahoruralwater.com

Res 5. Idaho State Department of Agriculture

Topics: Pesticides programs, fertilizers, soil and plant amendments, weed management and Idaho Home & Farm*A*Syst Program.

(208) 332-8500

http://www.agri.state.id.us/

Res 6. Southwest District Health (SWDH)

Topics: Land development and individual/subsurface sewage disposal systems.

(208) 549-2370 or (208) 455-5400

Res 7. University of Idaho Cooperative Extension System – local office

Topics: Master Gardeners.

(208) 414-0415

http://extension.ag.uidaho.edu/washington

Res 8. United States Department of Agriculture – Cooperative State Research, Education and Extension Service State Partners

Topics: Links to websites of the schools of forestry, higher education, human services, veterinary sciences, state extension services, and state experiment stations.

http://www.reeusda.gov/1700/statepartners/usa.htm

Res 9. United States Environmental Protection Agency (EPA) – Drinking Water Academy (DWA)

Topics: Public drinking water.

(208) 378-5746 or 1-(800) 426-4791

http://www.epa.gov/safewater/dwa.html

Res 10. United States Environmental Protection Agency (EPA) - Safe Drinking Water Act

Topics: Public drinking water.

(208) 378-5746 or 1-(800) 426-4791

Res 11. United States Geological Survey

Topics: Soil and water mapping, ground and surface water information, and general geological information.

(208) 387-1300

http://idaho.usgs.gov

http://idaho.usgs.gov/projects/sr3

Animal Feeding Operations:

AFO 1. Idaho Association of Soil Conservation Districts (IASCD)

Topics: Site maps, programs (Soil Conservation Districts, TMDLs, Envirothon, Idaho State Forestry Contest, Home*A*Syst, Lake*A*Syst), conferences, and numerous web links.

(208) 338-5900

http://www.iascd.state.id.us

http://www.iascd.org

http://wwwnacdnet.org

AFO 2. University of Idaho Cooperative Extension System – local office

Topics: Research-based education.

(208) 414-0415

http://www.uidaho.edu.ag/extension

http://www.sustainable.doe.gov/database/451.html

AFO 3. United States Environmental Protection Agency (EPA) – Office of Science and Technology and Office of Wastewater Management

Topics: Proposed rules, permit nutrient plans, publications, regulations, outreach contacts.

(208) 378-5746 or 1-(800) 426-4791

http://www.epa.gov/npdes/afo

http://www.eap.gov/owmitnet/afo.htm

AFO 4. Idaho State Department of Agriculture

Topics: Regulation of dairy and feedlot facilities, dairy and beef AFO water quality monitoring, nutrient management planning, engineering and technical services, animal health, milk quality, aquiculture, weed management, and Idaho Home & Farm*A*Syst Program.

(208) 332-8500

http://www.agri.state.id.us

Other links for more information:

ISDA maintains a list of agricultural and governmental sites. This list is very extensive and complete.

www.agri.state.id.us/links.htm

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Appendix F – Well Owner Information

A Well Owner's Responsibilities

A well owner has responsibilities?

Ah, to be the owner of your own domestic well with no monthly water bills to pay. This situation is typical in areas outside of cities where there are no city services available. However, we need to remember why it is that people are billed for their water and sewer services. They are paying the company to take care of that system and to inform them if the water is not safe to drink. So, if you have your own well, **you** are responsible for the maintenance of your well system and for ensuring that your water is safe to drink. There are no government entities that will come to your house to test your water to make sure that it is safe for human consumption if you own a domestic well. This is your responsibility. Don't worry. You will not have to spend a lot of time learning how to make sure your water is safe to drink. There are professionals to assist you with that knowledge.

This bulletin focuses on water quality, which is important to human health. The information provided in this bulletin will assist you with important decisions about the maintenance and care of your well.

Well Maintenance

The two tasks for well maintenance

You're probably asking yourself, "What are the basic things that I should do to maintain my well?" There are two basic tasks that you should do routinely: 1) periodically test your water, and 2) protect your wellhead. Water testing is not difficult and doesn't have to be expensive. You should perform a few water tests at least once a year. Recommended tests are for total coliform bacteria and nitrate, at a minimum. If there are other known ground water contaminants in your area, test for those contaminants as well.

Periodic Testing

Total Coliform Sampling

Bacteriological analyses are the principle tests used to assess the sanitary quality of water and the potential health risk from waterborne disease. The presence of total coliform can show a possible impact from changes made to the well and piping, land and water use, failing septic systems, and/or stormwater. If total coliform shows up in a water analysis, opportunistic bacteria may be present and other organisms that can cause gastrointestinal problems such as giardiasis, amoebic dysentery, and typhoid increases may be present also. The regulatory level for total coliform is less than one colony of bacteria per 100 milliliters of water. If bacteria are found above the regulatory level, the well will need to be disinfected and re-sampled. Don't panic – bacterial contamination is very common. Studies show that more than 40 percent of domestic wells are contaminated with total coliform. Call either your local Department of Environmental Quality or Health District office for instructions on disinfecting a well and emergency procedures for disinfection of drinking water.

Nitrate Sampling

Elevated levels of nitrate can pose a health problem and can be a leading indicator of other water quality problems. Nitrate levels tend to increase with the presence of other contaminants in the water supply, such as fertilizer or septic wastes. The regulatory level for nitrate is 10 mg/l, and levels in excess of this amount have been associated with methemoglobinemia, which is the inability to absorb oxygen in the blood system. Methemoglobinemia is a particular risk to newborns and infants up to 6 months of age. In infants, methemoglobinemia is often referred to as "Blue Baby Syndrome." However, adults with reduced stomach acidity, and people deficient in the enzyme that converts methemoglobin back to hemoglobin are also susceptible to nitrite-induced methemoglobinemia. According to the U.S. EPA Office of Water, effects of chronic exposure to high levels of nitrate include diuresis, increased starchy deposits, and hemorrhaging of the spleen. Current research is looking at the link between elevated nitrate and the risk of miscarriages and non-Hodgkin lymphoma.

If nitrate is found in your well above the regulatory level, water treatment systems are available from some manufacturers. Boiling your water DOES NOT remove nitrate, but concentrates it.

Are There Other Tests I Should Perform?

In addition to having your well tested at least once a year for total coliform, nitrate, and other contaminants of concern, your drinking water source should be checked any time there is a change in taste, odor, or appearance, or anytime a water supply system is serviced.

Testing Costs

Nitrate and total coliform tests usually cost less than $20 each. That expense can be viewed as cheap insurance to determine that your water is safe to drink. Call your local laboratory listed in the phone book, or your local Idaho Department of Environmental Quality Regional Office to find out where to get necessary sample containers, how to take the sample, and when to get the sample to the laboratory. Also, there are environmental consultants listed in the phone book who can sample for you, but be sure to inquire about cost.

Protecting Your Wellhead

Things to consider at and near the well

What about protecting your wellhead? What measures should be taken?

- ✓ Periodically inspect exposed parts of the well for problems such as cracked, corroded, or damaged well casing; a broken or missing well cap; and settling or cracking surface seals.
- ✓ The area around the well should be sloped to drain surface water away from the well.

- ✓ When landscaping, keep the top of your well at least 18 inches above the ground.
- ✓ Be careful when working or mowing around your well. A damaged casing could jeopardize the sanitary protection of your well. Don't pile snow, leaves or other materials around your well.
- ✓ The well's casing should extend a minimum of 20 feet below the ground surface and preferably be driven at least five feet into an impermeable layer.
- ✓ Existing wells in areas with a history of flooding should have the casing elevated at least two feet above the highest known flood level and should have a water tight sanitary seal at the top of the grouted casing.
- ✓ A well cap or sanitary seal should be installed to prevent animals or other vermin from getting into your well and to prevent unauthorized use of or entry into the well.
- ✓ A sanitary seal or concrete platform should be set around the wellhead to keep pollutants from entering the well bore.
- ✓ Keep accurate records of any well maintenance such as disinfection, sediment removal, pump replacement, or plumbing modifications requiring the use of chemicals in the well.
- ✓ Hire a licensed well driller for any new well construction, modification, or abandonment and closure.
- ✓ Avoid mixing or using fertilizers, herbicides, insecticides, degreasers, fuels, motor oil, and other pollutants near the well.
- ✓ Don't allow backsiphoning when mixing pesticides, fertilizers or other chemicals. Don't put the hose inside the tank or container.
- ✓ Be sure to have a check valve on your lawn watering systems to prevent backflow.
- ✓ Always maintain a minimum of 100 feet between the water source and a subsurface sewage absorption area.
- ✓ Do not cut the well casing below the ground surface.
- ✓ Pump and inspect septic systems every 2-3 years.
- ✓ Maintain your septic system and never dispose of hazardous materials in a septic system.
- ✓ When your well has come to the end of its serviceable life (usually more than 20 years), contact the Department of Water Resources and have your qualified water well contractor properly decommission your well after constructing your new well.

Home Treatment Systems

Treatment Systems for Water Problems

What should you do if you have problems with your water quality? It is important first to distinguish between water quality problems that may be harmful to your health, and water quality problems that are only aesthetic

problems. Hard water is a common aesthetic problem. Once you have decided to install a home water treatment system, remember that no one treatment unit can solve all water quality problems.

- ✓ Water testing will confirm your water treatment needs.
- ✓ Depending on your water quality information, you may need to combine treatment units into one system.
- ✓ Research treatment systems that are available. Check performance capabilities, warranty, maintenance provisions, and general operation.
- ✓ Consider capacity, special features, and company service – as well as price – when you make your choice.

When looking at water treatment systems: **BEWARE OF FALSE ADVERTISERS!** Protect yourself from deceptive sales practices.

- ✓ Remember that water testing confirms your water treatment needs. Without the water testing results, how can anyone know your needs?
- ✓ Contact the National Sanitation Foundation to make sure the treatment system is certified to perform as stated, or has the National Sanitation Foundation seal of approval on the system.
- ✓ Avoid being misled by false claims and scare tactics. Research the reputation and legitimacy of the company or sales representative that has called on you.
- ✓ Avoid signing contracts or binding agreements for "one-time offers," or for those that place a lien on your home.
- ✓ Be very careful about giving credit card information over the telephone.
- ✓ Check thoroughly into any offers that involves prizes or sweepstakes winnings.
- ✓ Be wary of "free" water testing that is provided by the salesperson to determine your water quality; many tests are inaccurate and misleading.
- ✓ If you are concerned about a company and its sales practices, contact your local Better Business Bureau.
- ✓ If you feel you have been subjected to misrepresentation, contact the Federal Trade Commission, your local Better Business Bureau, and/or the Idaho Attorney General's Office.

For more information call the Idaho Department of Environmental Quality Regional Office in your area:

Boise Regional Office 373-0550
Coeur D'Alene Regional Office 769-1422
Idaho Falls Regional Office 528-2650
Lewiston Regional Office 799-4370
Twin Falls Regional Office 736-2190
Pocatello Regional Office 236-6160

More Information on the Internet

There is a wealth of information available on the Internet. Many environmental agencies have webpages of information available. Some excellent sites to check out are:

Department of Environmental Quality
http://www.state.id.us/deq/

Environmental Protection Agency
http://www.epa.gov/safewater/dwhealth.html

Farm*A*Syst
http://www.wisc.edu/farmasyst

Idaho Department of Water Resources
http://www.idwr.state.id.us

National Sanitation Foundation
http://www.nsf.org

U.S. Geological Survey
http://www.usgs.gov

Well Owner
http://www.wellowner.org

University of Idaho Water Quality Homepage
http://www.uidaho.edu/wq

Idaho One Plan
http://www.oneplan.org

Idaho State Department of Agriculture
http://www.agri.state.id.us

Most of these sites provide access to contacts for specific questions. If the Internet is not readily available for you or you need other information, look up the agency in your telephone book and give them a call. It is good to inquire whether there are any known ground water contamination concerns in your area, either occurring naturally or from human activities.

Appendix G - BMP Examples

The following are some examples of BMP technical information and/or BMP field examples. Be sure to contact the University of Idaho, Weiser River Soil Conservation District, or the Natural Resources Conservation Service for this information or other information to fit your needs (see Appendix D).

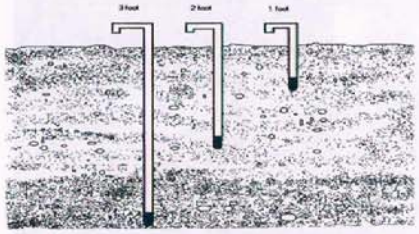
These agencies have a wealth of information for assisting you with your needs. They have knowledge of the most current techniques for your agricultural success and environmental stewardship.

Watermark Sensors

The University of Idaho Extension Office installed a soil moisture sensing system in the same field as our filter strip. Both data sets collected from each individual practice should give us invaluable data for soil, water holding capacity, runoff and sediment-nutrient reductions.

Steve Reddy of the Washington County Extension Office

Diagram of Sensor Placement

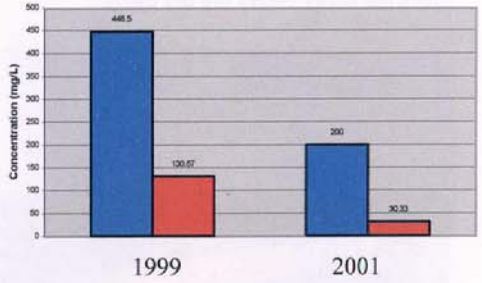


For additional information regarding watermark sensors contact: Steve Reddy, Wash. Co. Extension Office,
485 E. 3rd St., Weiser, Idaho 83672
Phone 208 414-0415

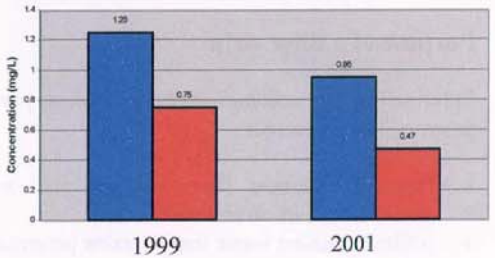
Filter Strip Results

- No reduction was observed for Ortho-phosphorus (dissolved component) or Nitrate-Nitrite Nitrogen during 1999 or 2001. Total phosphorus is actually attached to sediment.
- For Total Suspended Solids during the 2001 irrigation season, an 68% reduction was recorded.

Total Suspended Solids for 1999 Sugar beets and 2001 Onions



Total Phosphorus for 1999 Sugar beets and 2001 Onions



For additional information regarding a filter strip contact: Weiser River Soil Conservation District or Natural Resources Conservation Service at:
847 E. 9th St., Weiser, Idaho 83672
Phone 208-549-4250

Weiser River Soil Conservation District

Filter Strip Project

Improving Water Quality...

History of Filter Strip Project

In the spring of 1999, the Weiser River Soil Conservation District secured an education grant through the Environmental Quality Incentives Program (EQIP) to conduct a study on the effectiveness of a vegetative filter strip to improve water quality. In 1999 the filter strip was installed on a beet field and 2001 on an onion field.

The type of filter strip designed for this project was different than what is typically used on surface irrigated cropland. For this project:

- Runoff water from the corrugates entered directly into a tail ditch and was delivered to the filter strip through a corrugated pipe.

- The water was then able to spread out through a pre designed area of wheat and collect in a structure. This allowed us to have distinct inlet and outlet points from which to sample.
- Sampling was conducted throughout the summer during each irrigation cycle.
- This type of study provides invaluable information to landowners and resource management agencies, especially in light of the Total Maximum Daily Loads (TMDLs) now being developed statewide.

What is a Filter Strip

A conventional vegetative filter strip usually consists of :

- A band of either annual or perennial vegetation spanning across the bottom of a field, varying in width depending on the erosion potential of the particular field.
- Each corrugate is pulled partially into the filter strip allowing tail water to enter the strip and spread out through the band of vegetation, thus slowing down the flow of water and allowing suspended materials to settle out before the water enters the tail ditch.

Purpose of a filter strip

Filter strips can accomplish the following purposes on the landscape:

- Remove sediment (both mineral and organic) from run-on and wastewater.
- Infiltrate run-on water that contains potential pollutants.
- Provide food and habitat for wildlife.
- Combine with other conservation practices to protect sensitive areas.
- Convert concentrated flow and trap sediment.

Collected Data

For informational purposes the District collected soil samples to determine if or how much accumulation of nitrates, phosphorus and potassium there would be over the course of a growing season. Samples were then taken to a lab for analysis.

On site sampling, from the inlet and outlet areas.

Samples are bottled and taken to a laboratory for analysis.

IMPACT

University of Idaho Cooperative Extension System

Washington County Cooperative Extension System, Weiser, ID

Soil Moisture Monitoring Equipment Helps Growers Reduce Runoff and Deep Percolation of Nutrients

The Situation

Southern Washington County, near the Snake River, is an agricultural area with a naturally high water table. The groundwater in this area has been identified as having high concentrations of nitrate nitrogen. Surface waters have also been found to have high levels of sediment and nutrient runoff.

Our Response

The University of Idaho Cooperative Extension System introduced a demonstration project in sugarbeets in the spring of 2000 using Watermark sensors and Hansen monitors. The equipment allows a grower to monitor the soil moisture at various depths in the field. By knowing the soil moisture at various depths the grower can more accurately schedule and apply irrigation water while minimizing runoff and deep percolation of nutrients. In 2001, the project was expanded to include a sugarbeet field and two onion fields in the area. Growers can push a button on the monitor to view the current soil moisture and view up to five weeks of graphed data. Graph printouts of the soil moisture data were produced by the Extension office using Excel software and made available to the growers weekly.

In addition to the moisture data, soil samples were taken from various depths at the beginning and end of the season to track nitrate movement.

Figure 2. Soil moisture monitor placed at the head of a sugarbeet field.

Achievements

Two prominent growers in the Weiser area are now using the sensors and monitors in their sugarbeet and onion crops. Both growers have identified excess irrigations that can be eliminated from their future management schedules. One onion grower will modify his fertilizer application method after finding that he was applying nitrogen in excess of the crop's needs. A commercial poplar tree grower will also use the sensors in 2002 to determine the optimum irrigation schedule for this alternative crop.

University of Idaho College of Agriculture

Also the Washington County Natural Resource Conservation District has recognized the value of the sensors and monitors and has now included them as cost share items to growers.
Presentations were made to the Nampa Irrigation Show, the UI Sugarbeet School, the Idaho Ground Water Coordinating Committee, and Weiser recertification workshops on use of the equipment and data.
Finally, the newly formed Weiser Ground Water Quality Committee is evaluating the sensors and monitors as part of its water protection guidelines for the community.

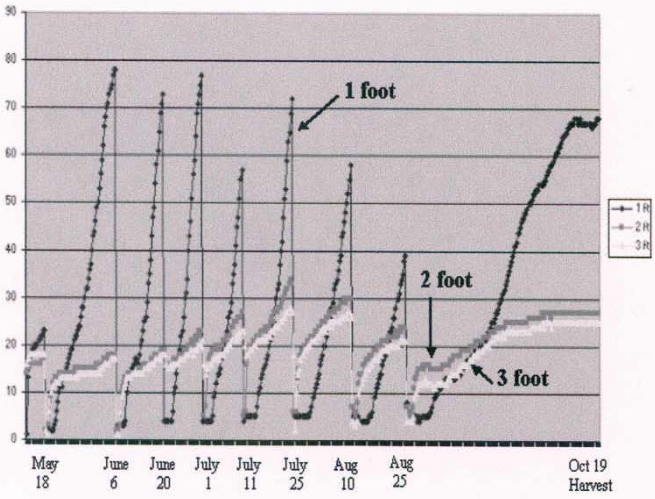


Figure 2. Soil moisture graph for the entire season on a Weiser sugarbeet field (0 is saturated, -90 is very dry).

The Future

The project will continue in irrigated crops such as onions and sugarbeets to demonstrate opportunities for improved water scheduling and runoff reduction. The goal is to get more growers using the equipment, either through direct purchase or through NRCS programs, so that water use is matched to crop needs and less agricultural materials are lost from the field.

Cooperators

Washington County and Canyon County Extension Educators; Jerry Neufeld
Extension Potato Specialist: Grad Geary
Extension Sugarbeet Specialist: John Gallian
Extension Irrigation Specialist: Howard Neibling

For More Information

Steven J. Reddy, Extension Educator
University of Idaho
Washington County Extension System
485 East Third
Weiser, Idaho 83572
Phone: 208-414-0415
Fax: 208-414-0469
E-mail: sreddy@uidaho.edu

Irrigation Demonstration Plots Update

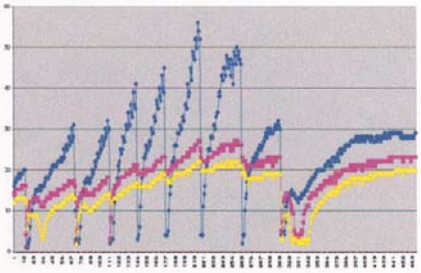
Steve Reddy -Sugarbeet Working Group – Dec.10 Twin Falls

2000

1. Learned how to install and use sensors and monitors
2. Designed the demonstration plot layout
3. Established demonstration plots in Washington/Canyon Co. on furrow-irrigated fields
4. Sampled soil at beginning and end of year for nitrate
5. Demonstrated benefits of sensor based scheduling on crop quality, yield, production costs, and nitrate loss.
6. Wrote newsletter articles and presented at the 2001 Beet School

2001

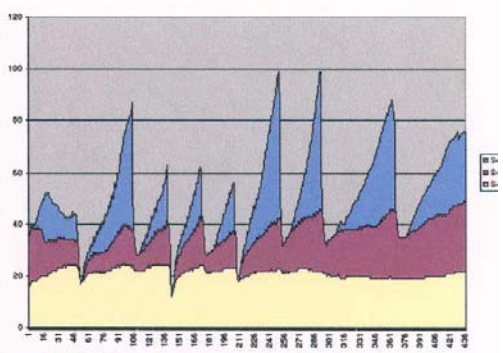
1. Established demonstration plots in Washington/Canyon Co. on furrow-irrigated fields
2. Improved equipment installation procedures
3. Sampled soil at beginning and end of year for nitrate
4. Demonstrated benefits of sensor-based scheduling on crop quality, yield, production costs, and nitrate loss.
5. Wrote Impact Statements, reports, and newsletter articles
6. Presented information at the 2002 Beet School
7. Washington Co. NRCD includes sensors as BMP



	Treatment	Control	Bowmont Avg.
Pounds N/ac (UAN 32)		50	
N Application Costs*($/ac)		9.75	
N Cost/Acre ($/ac)		14.9	
Value of Beets/ac ($)	35	35	
Net Yield (t/ac)	36.25	34.56	33.10
Tare (%)	7.1	7.7	8.7
Sugar (%)	16.41	16.68	16.53
Estimated Recoverable Sugar (lbs)	10589	10094	9414
Nitrate (ppm)	167	233	351
Conductivity	0.47	0.55	0.67

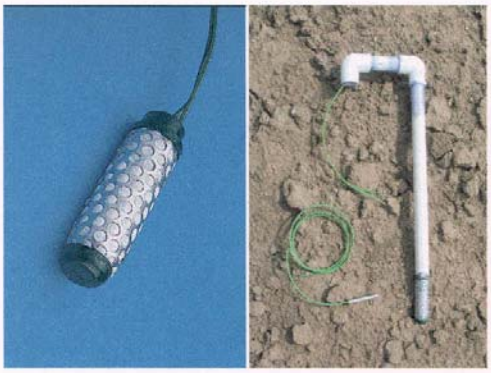
2002

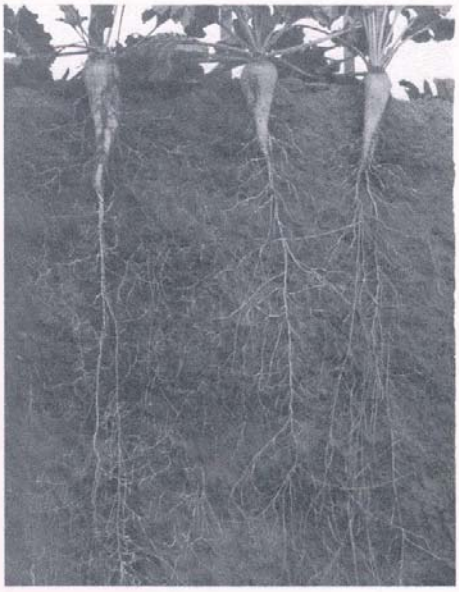
1. Established demo. plot in Washington Co. under sprinkler irrigation and demo plot in Canyon Co. under furrow irrigation
2. Sampled soil at beginning and end of year for nitrate
3. Introduced soil water extraction for analysis of nitrate.
4. Held a Water Awareness Day and a Nutrient Management Workshop in Washington Co.
5. Demonstrated benefits of sensor-based scheduling on crop quality, yield, production costs, and nitrate loss.
6. Wrote newsletter articles and plan on presenting information at the 2003 Beet School and the Nampa Irrigation Conference in Dec. 2002
7. Included results in Washington Co. water protection plan BMP guidelines
8. Washington Co. growers begin purchase of sensors.



2003

1. Plan to establish demo plot in Canyon Co. under sprinkler irrigation
2. Plan to establish demo plot in Washington Co. under surge irrigation.
3. Plan to continue documenting benefits of sensor-based irrigation scheduling.
4. Plan to begin preparation of Sugarbeet Growers Handbook or University CIS Bulletin





Natural Resources Conservation Service
Irrigation Water Management
Example on Weiser Flat

NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

SEDIMENT BASIN

(No.)

CODE 350

Definition

A basin constructed to collect and store debris or sediment.

Scope

This standard applies to the installation of all basins where the primary purpose is to trap and store waterborne sediment and debris.

Purpose

To preserve the capacity of reservoirs, ditches, canals, diversions, waterways, and streams; to prevent undesirable deposition on bottom lands and developed areas; to trap sediment originating from construction sites; and to reduce or abate pollution by providing basins for deposition and storage of silt, sand, gravel, stone, agricultural wastes, and other detritus.

Conditions where practice applies

This practice applies where physical conditions or land ownership preclude treatment of a sediment source by the installation of erosion-control measures to keep soil and other material in place or where a sediment basin offers the most practical solution to the problem.

Planning considerations

Water Quantity

1. Effects on the water budget, especially on volumes and rates of runoff, infiltration, evaporation, transpiration, deep percolation, and groundwater recharge.
2. Effects on downstream flows and aquifers that would affect other water uses and users.
3. Effects on volume of discharge flow on the environmental, social, and economic conditions.
4. Effects on the water table downstream and the results of changes of vegetative growth.

Water Quality

1. Effects on erosion, movement of sediment, pathogens, and soluble and sediment-attached substances that could be carried by runoff.

2. Effects on the visual quality of onsite and downstream water resources.

3. Effects of construction and early establishment of protective vegetation on the surface and ground water.

4. Effects on wetlands and water-related wildlife habitats.

Design criteria

The capacity of the sediment basin shall equal the volume of sediment expected to be trapped at the site during the planned useful life of the basin or the improvements it is designed to protect. If it is determined that periodic removal of sediment will be practicable, the capacity may be proportionately reduced.

The design of dams, spillways, and drainage facilities shall be according to SCS standards for ponds (378) and grade stabilization structures (410) or according to the requirements in TR-60, as appropriate for the class and kind of structure being considered.

Temporary basins having drainage areas of 5 acres or less and a total embankment height of 5 ft or less may be designed with less conservative criteria if conditions warrant. The embankment shall have a minimum top width of 4 ft and side sloped of 2:1 or flatter. An outlet shall be provided of earth, pipe, stone, or other devices adequate to keep the sediment in the trap and to handle the 10-year-frequency discharge without failure or significant erosion.

Provisions shall be made for draining sediment pools if necessary for safety and vector control. Fencing and other safety measures shall be installed as necessary to protect the public from floodwater and soft sediment. Due consideration shall be given to good visual resource management.

Plans and specifications

Plans and specifications for installing sediment basins shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.


JAN 6 2003

NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

IRRIGATION SYSTEM, TAILWATER RECOVERY

(No.)

CODE 447

Definition

A planned irrigation system in which all facilities utilized for the collection, storage, and transportation of irrigation tailwater for reuse have been installed.

Purpose

This practice may be applied as part of a conservation management system to support one or more of the following:

- Conserve irrigation water supplies
- Improve offsite water quality

Conditions where practice applies

Tailwater recovery systems are suitable for use on lands and facilities that are served by a properly designed and installed irrigation system where recoverable irrigation runoff flows can be anticipated under current or expected management practices.

This standard applies to the planning and functional design of irrigation tailwater recovery systems including, but not limited to, pickup ditches, sumps, pits, and pipelines. It does not apply to detailed design criteria or construction specifications for individual structures or components of the recovery system.

Criteria

General Criteria Applicable To All Purposes

The installation and operation of a tailwater recovery system shall comply with all federal, state and local laws, rules and regulations.

Facilities needed for a tailwater recovery system shall be designed and constructed according to appropriate NRCS standards and specifications. The criteria for the design of components not addressed in a NRCS practice standard shall be consistent with sound engineering principles.

Collection Facilities. Facilities for the collection of irrigation tailwater can be an integral part of irrigation systems covered by NRCS Conservation Practice Standards 443- Surface and Subsurface and 442-Sprinkler. These facilities may include, but are not limited to, ditches, culverts, pipelines, water control and/or grade stabilization structures or other erosion control measures, as needed.

Storage Facilities. Facilities are needed to store the collected water until it is

redistributed in the irrigation system. Runoff volume and rate, as well as the required level of water control at the point where the tailwater is returned to the irrigation system, should be considered in determining the size of the storage facility.

For systems where tailwater is discharged into an irrigation pit or regulating reservoir or into a pipeline having facilities for regulating fluctuating flows (i.e. a float valve), small sumps with frequently cycling pumping plants may be used. For systems unable to regulate flows, tailwater sumps or pits shall be made large enough to provide the regulation needed to permit efficient use of the water.

When energy sources for tailwater pump back systems are subject to interruption, safe emergency bypass areas cannot be provided, or tailwater discharges violate local or state regulations, tailwater storage requirements shall, as a minimum, include a volume adequate to store the complete runoff from a single irrigation set.

Sumps and pits shall be equipped with inlets designed to protect the side slopes and the collection facilities from erosion. A dike, ditch, or water control structure shall be provided, if required by state law, to limit the entrance of rainfall runoff into the designed inlet. Sediment traps shall be installed as needed.

Conveyance Facilities. All tailwater recovery systems require facilities to convey water from the storage facility to a point of entry back into the irrigation system. These facilities may consist of a pumping plant and pipeline to return the water to the upper end of the field, or a gravity outlet having a ditch or pipeline to convey the water to a lower elevation in the irrigation system. Other components or combinations of components may be necessary as determined on a site-specific basis.

The capacity of conveyance facilities shall be determined by an analysis of the expected runoff rate, the planned irrigation pit or regulating reservoir storage capacity, and the anticipated irrigation application. If the return flow is used as an independent irrigation supply rather than as a supplement to the primary irrigation water supply, the rate and volume of flow must be adequate for the method(s) of water application employed.

Additional Criteria Applicable To Improving Water Quality

Storage Facilities. Where additional storage is required to provide adequate retention time for the breakdown of chemicals in the runoff waters, storage facilities shall be sized accordingly. Allowable retention times shall be site specific to the particular chemical used.

Seepage from a storage facility shall be controlled to the extent possible when the storage facility is expected to receive chemical-laden waters. Control may be in the form of natural soil liners, soil additives, commercial liners, or other approved methods.

Where additional storage is required to provide for sediment deposition, storage facilities shall be sized accordingly. Allowable retention times shall be site specific to the particular soil type(s).

CONSIDERATIONS

Irrigation systems should be designed to limit tailwater volumes to that needed

for effective operation. This reduces the need or minimizes the size and capacity of collection, storage, and transportation facilities. Changes in irrigation water management activities will be necessary to accommodate return flows.
Nutrient and pest management measures should be planned to limit chemical-laden tailwater as much as practical. Chemical-laden water can create a potential hazard to wildlife, especially waterfowl that are drawn to ponded water.
Protection of system components from storm events and excessive sedimentation should be considered.
Downstream flows or aquifer recharge volumes dependent on runoff will be reduced. Existing wetland hydrology could be impacted by this practice.
This practice may adversely affect cultural resources and must comply with GM 420, Part 401 during planning, installation, and maintenance.

Plans and specifications

Plans and specifications for irrigation tailwater recovery systems shall be prepared for specific field sites in accordance with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

OPERATION AND MAINTENANCE

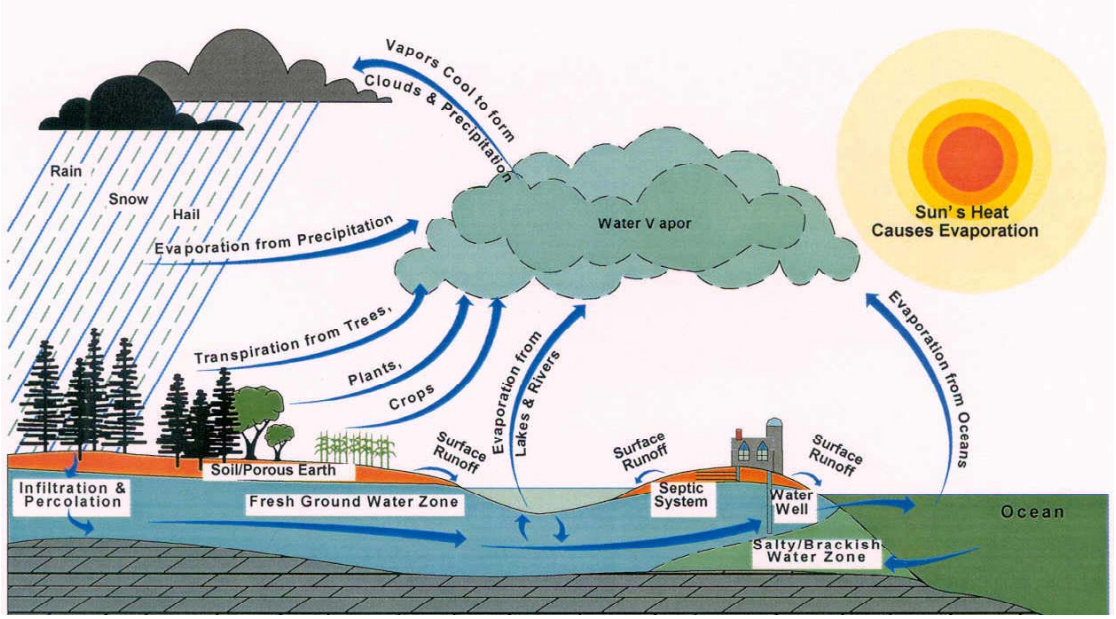
An Operation and Maintenance plan specific to the facilities installed shall be prepared for use by the landowner or operator responsible for operation and maintenance. The plan should provide specific instructions for operating and maintaining facilities to ensure they function properly. The plan shall include provisions to address the following, as a minimum:

- Periodic cleaning and re-grading of collection facilities to maintain proper flow lines and functionality.
- Periodic checks and removal of debris as necessary from trash racks and structures to assure proper operation.
- Periodic removal of sediment from traps and/or storage facilities to maintain design capacity and efficiency.
- Inspection or testing of all pipeline and pumping plant components and appurtenances, as applicable.
- Routine maintenance of all mechanical components in accordance with the manufacturer's recommendations.


JAN 6 2003

Appendix H – Hydrologic and Nitrogen Cycle

Hydrologic Cycle



Nitrogen Cycle